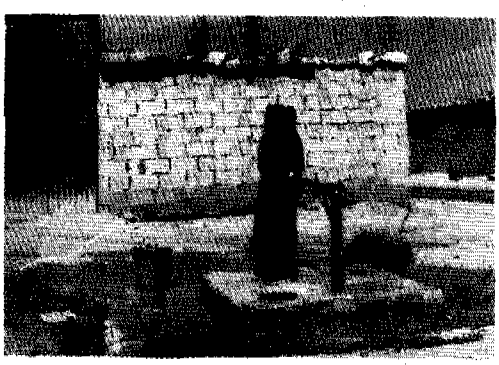
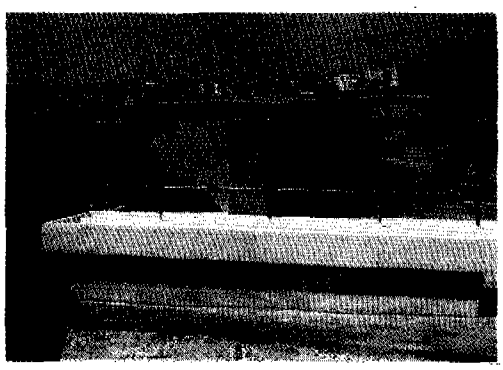
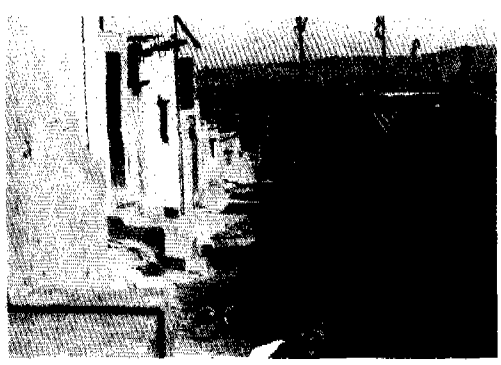
CEHA Document No. TLM-1

Manual on Water and Sanitation for Health in Refugee Camps





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WORLD HEALTH ORGANIZATION
EASTERN MEDITERRANEAN REGIONAL OFFICE
CENTRE FOR ENVIRONMENTAL HEALTH ACTIVITIES

UNEP/ROWA
UNITED NATIONS ENVIRONMENT PROGRAMME
REGIONAL OFFICE FOR WEST ASIA

Front Cover Photos

Water and Sanitation in Refugee Camps

Left to Right

Public Water Point
Installation of Percolation Trench
Solid Waste Collection and Transfer
Sanitation Facilities in Schools
Overview of Poor Sanitation
Maintenance of Surface Drainage Channels

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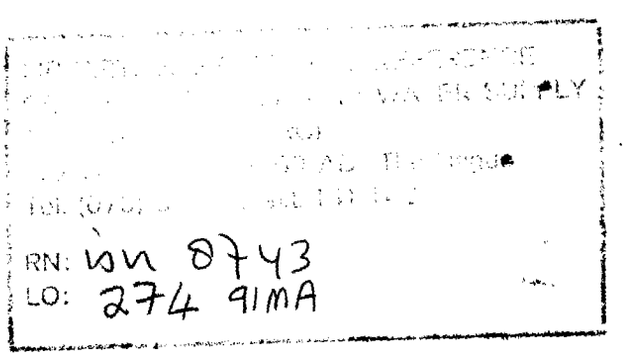

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WHO/EMRO/CEHA
World Health Organization
Eastern Mediterranean Regional Office
Centre for Environmental Health Activities

UNEP/ROWA
United Nations Environment Programme
Regional Office for West Asia

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TRAINING COURSE ON WATER SUPPLY,
SANITATION AND HEALTH FOR ENVIRONMENTAL
HEALTH OFFICERS WORKING WITH THE PALESTINIAN PEOPLE
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The Project was in compliance with the General Assembly Resolution in Assistance for the Palestinian People and Decisions on Promotion of Biological Safety, on enhancing the health of the Palestinian People and on Health and the Environment.

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INTRODUCTION

The problem of caring for refugees is being faced by many countries who are hard-pressed to address it within the framework of other emergency programmes. Natural disasters such as earthquakes, floods and droughts may lead to the existence of refugees. In addition, wars and acts of aggression on civilian populations from within the nation and by outside attackers also lead to the displacement of large populations from their home and work areas to other regions that may be safer but lack sanitary facilities or conditions for healthy living. Consequently, international relief efforts are being made to provide refugees with shelter, food, water and sanitation facilities to alleviate their suffering at least on a temporary basis.

It is estimated that there are more than eight million refugees in the countries of the WHO Eastern Mediterranean Region. This phenomenon has led a number of governments and international organizations to take significant measures to provide them with needed services ranging from primitive and inadequate levels to services approaching those rendered to surrounding towns for permanent communities.

These semi-permanent communities now exist in the Palestinian refugee camps which have been in existence for more than 40 years, supported by the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) and by the governments of the host countries where the refugee camps have been established. It may be stated that UNRWA's experience in relieving the Palestinian refugees is the longest and most elaborate refugee relief experience in modern history.

This manual aims at documenting UNRWA's experience particularly in the field of water supply, sanitation and vector control. It has been prepared for Environmental Health Officers working in the Palestinian Refugee Camps, but it is also applicable to other refugee situations as well as to other isolated communities that are located far from municipal water supply and sanitation systems. It emphasizes field operations and practical procedures.

1. THE PALESTINIAN REFUGEE POPULATION AND UNRWA SERVICES

1.1 The Palestine Refugee Problem

The Palestine refugee problem came into being in 1948 as a result of the disturbances before and after the occupation of Palestine and the creation of the state of Israel in Palestine. About three quarters of a million men, women and children were uprooted from their homes and land and forced to take refuge in Jordan, the West Bank, Gaza Strip, Lebanon and Syria (Fig. 1). Others were dispersed within and without the Arab World. There was an immediate and urgent need for food, clothes, shelter and basic environmental health services.

1.2 The Creation of UNRWA

As the hope of finding a rapid way for the Palestine refugees to return to their homes faded, the United Nations General Assembly in resolution number 302 of 8th December 1949 established the UNITED NATIONS RELIEF AND WORKS AGENCY for the Palestine Refugees in the Near East (UNRWA) to administer relief services to the refugees. The Agency began its actual operations on 1st May 1950. It was assumed that UNRWA would be a temporary agency and that the relief problem would soon be solved.

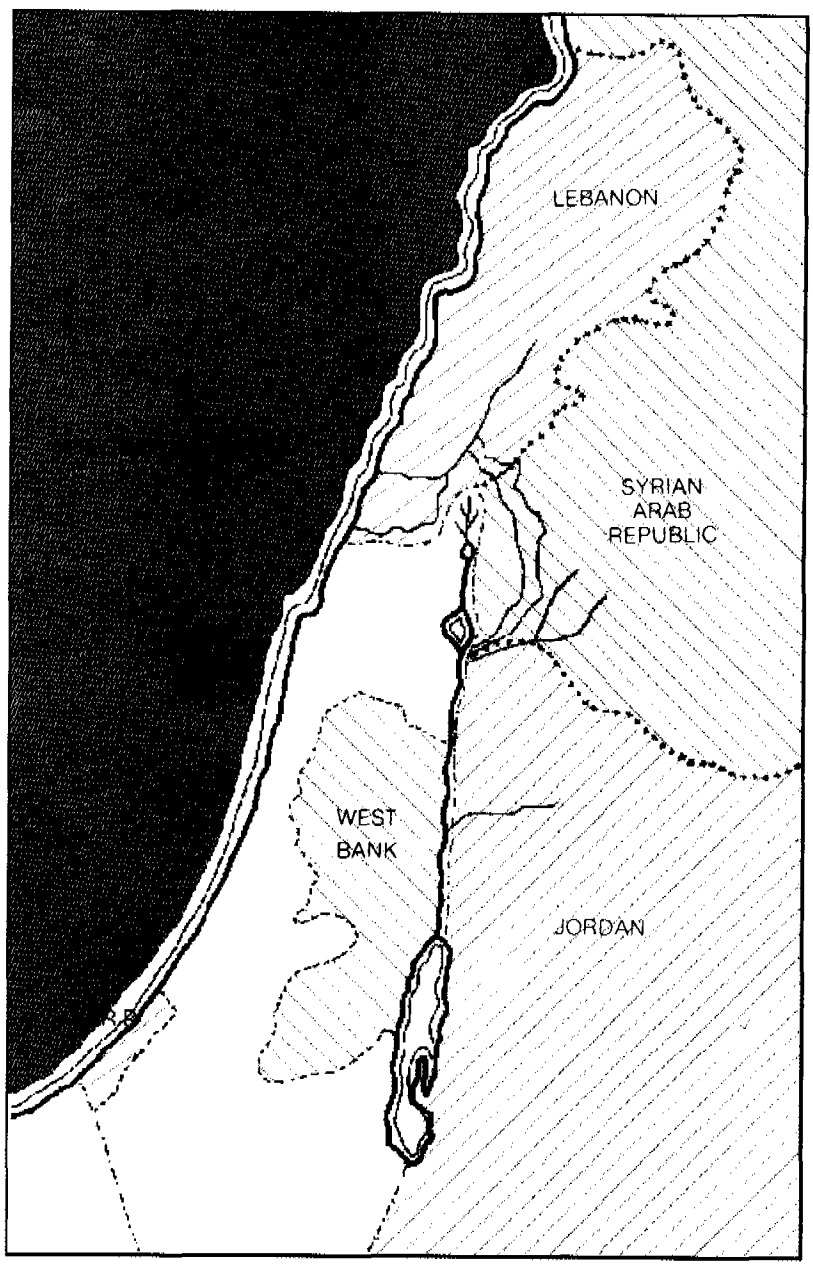
UNRWA's first priority, when established, was to achieve a reasonably modest standard of living for the refugees, which involved the provision of basic rations to sustain life, the establishment of camps to provide shelter, protection measures against endemic diseases and the introduction of social welfare facilities and a work programme aimed at helping individuals to be self-supporting and productive.

1.3 Population

Palestine in and before 1948 had been one of the most advanced parts of the Arab World, particularly in general economic growth and literacy. The population of Palestine was estimated at 1.75 million in 1945, about two thirds of the population were peasants (fellaheen) who lived and worked on their land growing a wide variety of crops. The other third was city dwellers (Hadar) -- craftsmen, businessmen and professionals -- and Bedouins (Badow) living a semi-nomadic life raising mostly sheep and goats.

The exact number of the Palestinians and the refugees was never accurately established as they were widely dispersed and some obtained nationalities other than their own. The present number of the Palestinians is estimated at about five million people and the number of registered refugees as of 31 December 1990 is 2,466,516 (943,819 in Jordan, 424,152 in the West Bank, 507,186 in the Gaza Strip, 306,471 in Lebanon and 284,888 in Syria).

Fig. 1
UNRWA Areas of Operation



1.4 UNRWA Services

1.4.1 Relief and Social Services

(a) Rations

The distribution of food rations was a basic element of UNRWA's relief programme for many years. Food rations continue to be distributed to hardship cases, e.g., widows, orphans and the disabled.

(b) Camps and Shelters

When UNRWA took over in May 1950, the refugees were hastily accommodated in tents and other inadequate and unsanitary accommodations. These accommodations were gradually replaced by huts built on land provided by the host governments.

The huts were built using a variety of materials -- mud and cement blocks, eternite, and zinc sheets with temporary roofing. The huts were built by UNRWA or by the refugees with or without assistance from UNRWA. The size varies depending on the family size. Each hut is located in an area of about 80 to 100m^2 which allows one to build an additional room, latrine, etc. More than 40 years later, the camps are heavily congested as three or four generations of refugees are living in the same area. There are 856,249 persons, about 35% of the registered refugees as of 31 December 1990, living in 60 camps (225,335 in ten camps in Jordan, 112,855 in 19 camps in the West Bank, 277,697 in eight camps in the Gaza Strip, 156,636 in 13 camps in Lebanon and 83,726 in ten camps in Syria).

(c) Social Services

UNRWA provides various social services, such as food rations and welfare assistance to hardship families and the handicapped, recreation and sport activities, assists in self-help projects and other miscellaneous welfare activities.

UNRWA provides services and has no legislative or police powers. The host governments are responsible for the maintenance of law and order and similar functions.

1.4.2 Education

In cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO), UNRWA offers six years of elementary education and three to four years of preparatory (lower secondary) education to all refugee

children. Many refugee children continue their secondary education in government or private schools. UNRWA contributes a number of university scholarships each year for gifted and needy Palestine refugee students and offers various vocational and teacher training courses for young men and women in its eight training centres.

1.4.3 Health

Under the technical supervision of the World Health Organization (WHO), UNRWA provides the following health services to refugees eligible for health care:

(a) Medical Care

It includes out-patient, medical and dental care and laboratory services provided in 104 UNRWA health centres/ points. In-patient medical care is provided in government, private and other hospitals usually subsidized by UNRWA.

(b) Health Protection and Promotion

Maternal and child care, immunization, nutrition and supplementary feeding programmes, control of communicable diseases, health education, community health and school health services are covered.

(c) Nursing

Nursing staff participate in the running and supervising of daily clinics, activities and home visiting.

(d) Environmental Health

Environmental health has been one of the essential aspects of the health services provided by UNRWA. The foundations of the programme were laid in the period 1948-1950 when the refugees had to be accommodated on an emergency basis. The programme has been confined primarily to the refugees living in camps. The programme comprises safe water supply, latrine facilities, removal and disposal of wastes (liquid and solid), control of insect and rodent vectors and ancillary facilities.

1.4.4 Support Services

Administration and personnel, finance, supply and transport, engineering, legal and public information services are covered.

2. ENVIRONMENTAL HEALTH IN CAMPS

2.1 Basic Principles of Environmental Health

2.1.1 Definitions

The WHO Expert Committee on Environmental Sanitation defined "Environmental Sanitation" in its first meeting in 1949 as: The control of all those factors in man's physical environment which exercise or may exercise a deleterious effect on his physical development, health and survival.

In particular it refers to the control of:

(a) Methods for the disposal of excreta, sewage, and community wastes to ensure they are adequate and safe;

(b) Water supplies, to ensure that they are pure and wholesome;

(c) Housing, to ensure that it is of a character likely to encourage healthful habits and to provide as few opportunities as possible for the direct transmission of disease;

(d) Milk and other food supplies to ensure that they are safe;

(e) Personal habits of cleanliness and of good public taste in relation to disease;

(f) Arthropod, rodent, mollusc, or other hosts of human disease;

(g) Atmospheric conditions to ensure that the external atmosphere is free from deleterious elements and that the internal conditions of workshops, houses, etc., are suitable for the occupations undertaken in them;

(h) Factories, workshops, dwellings, streets, and the general environment to ensure freedom from risk to health whether mechanical, chemical, or biological, and to provide the best working and living conditions.

2.1.2 Transmission of Disease

A communicable disease is transmitted from one man (or an animal host) to another man in a continuous cycle. The causative agent of the disease exits from the human carrier, then it is transferred by a vehicle (e.g., water, air, insects), enters into another human by the mouth, or skin, etc., multiplies inside the body causing damage leading to sickness or death. This process may by influenced by special factors such as nutrition and immunity.

An epidemic (appearance of a number of cases, unusually large or unexpected for the given place and time) may occur when factors that contribute to the rapid transmission of a communicable disease are present.

2.1.3 Environmental Health Measures

Environmental health measures break the cycle of transmission of communicable diseases (Fig. 2) by:

(a) Eliminating causative agents outside the human body (sterilization and sanitary disposal of human wastes);

(b) Eliminating vectors of disease (control of flies and mosquitoes);

(c) Protecting potential vehicles of disease (ensuring safe water, adequate sanitation and food safety).

Environmental health measures are also concerned with developing the role of the human individual and his responsibility towards himself, his society and his environment.

2.1.4 Causative Agents of Disease

Human wastes contain a large number of organisms, some of which may be disease-causing:

(a) Bacteria, or viruses transmitted by:

(1) Hand directly, or from hand to food during preparation.

(2) Unsafe drinking water or contaminated vegetables irrigated with polluted water and consumed raw.

(3) Flies while moving between wastes and food.

(b) Eggs of some parasites

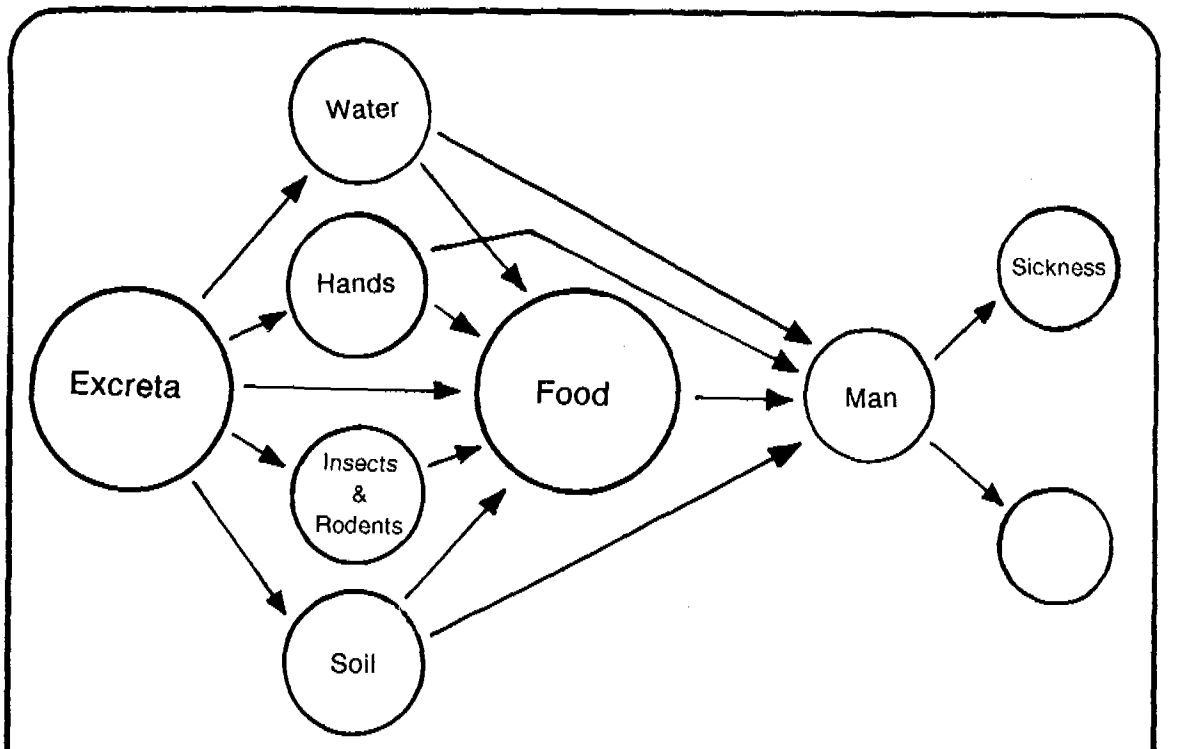
(1) Some develop in the soil in a few days after which the worm comes out and pierces the bare foot (Ancylostomiasis).

(2) Some stay inside the egg in the soil for a period up to several months and are then transmitted by the soiled hand to the mouth, or on soiled vegetables when consumed. The egg enters the body and the cycle continues (Ascariasis).

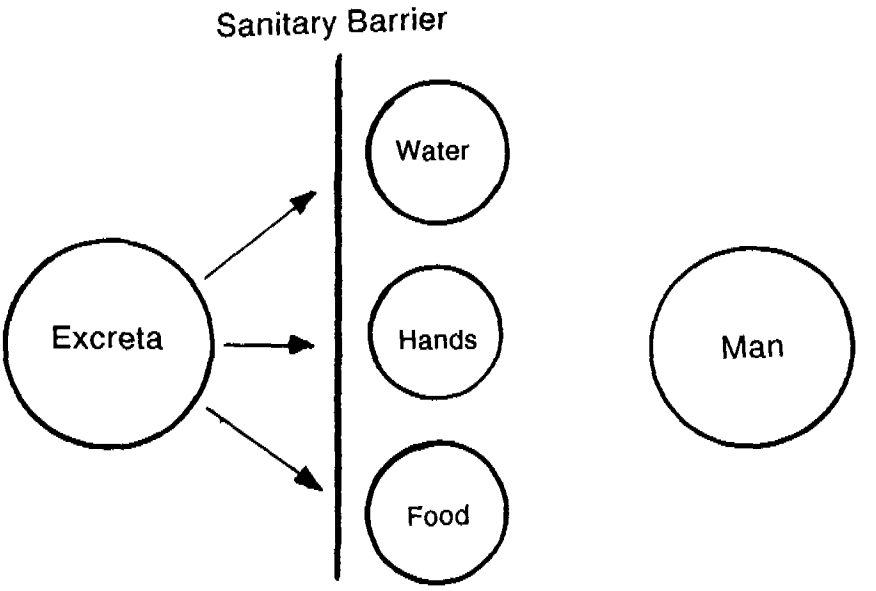
(3) Some after reaching the soil need to spend time in a host animal before becoming infective, and man is infected when he consumes the infected meat that is undercooked (Taenia saginata-beef tapeworm).

Fig. 2

Transmission and Prevention of Disease from Wastes



A. Transmission of Disease by Excreta



B. Prevention of Disease Transmission by Sanitation

(4) Some develop in water, pass to an aquatic host (a snail) for development and emerge in an infective form which pierces a person's skin when wading or swimming in the infected water (Bilharziasis-schistosomiasis).

2.2 Development of Environmental Health Services in Refugee Camps

The environmental health programme in the Palestine refugee camps started with the provision of the basic needs: clean water for drinking and cooking, collection and disposal of excreta and kitchen waste and limited insect control.

The environmental health services developed in the camps as time passed in spite of the limited financial resources. At present these services are similar to the ones provided by the host governments to other communities.

The programme also provided water supply and sanitation services to UNRWA installations such as schools, feeding centres, as well as to public places such as markets. Regular sanitary inspection of schools, feeding centres and market places is still carried out, and sanitary defects are reported for correction. Particular attention is given to improvement and upgrading of sanitary facilities at schools.

The environmental health services in the camps cover the following activities:

1. Water Supply
2. Waste Disposal
3. Surface Water Drainage
4. Insect and Rodent Control
5. Ancillary Facilities

2.2.1 Water Supply

When the camps were first established, water tankers were used to distribute water to the refugees in various areas for drinking, cooking and cleanliness at the rate of 5 to 10 litres of water per person per day. This method was later replaced by the installation of small reservoirs filled by water tankers for the refugees to collect their daily needs.

Some nearby water sources such as wells and springs were maintained and protected to supply the camp residents with water for basic needs. As these sources were neither adequate nor reliable to supply the refugees with their increasing demand for water, it became necessary to construct water distribution systems.

(a) Water Storage

All camps were provided with steel and/or concrete water reservoirs located on the highest spot in the camps for gravity water distribution throughout the distribution systems. The capacity of the water reservoirs correlated roughly with the daily water consumption when the camps were established, taking into consideration the availability of water and the topography of the camps.

(b) Water Distribution

Water from the water reservoirs was distributed through a pipe network to the various public water distribution points (public fountains or standpipes) which were available in all sectors of the camps, and also to the central installations.

The public water distribution standpipes equipped with taps were located such that the distance between any shelter and a water point did not exceed 300m. Each tap served 200 to 250 inhabitants. Taking into account the availability of water and the seasonal demands, the average daily per capita allowance of water for all purposes through the UNRWA network ranged from 10 to 20 litres.

Because of the relative improvement in the living conditions in the camps, the inhabitants needs became more than was provided by public water distribution points. Additional water was supplied by private water tankers filled with water from approved sources and sold to the camp inhabitants.

In camps located near municipalities, many families managed to connect their shelters to the municipal water systems against the payment of fees and the cost of water consumed. The increase in the number of private water connections from municipal sources in some camps made water distribution points in these camps redundant and they were eliminated.

The safety of water is checked regularly through weekly or fortnightly collection of water samples from various points in the water networks in the camps as well as the central installations. Chemical analysis is carried out by the concerned Government Authorities.

Water supply attendants and plumbers are provided with necessary tools for maintenance and repair of water supply facilities in the camps.

2.2.2 Waste Disposal

Waste in the camps includes human excreta, sewage and other wastewater, and solid wastes.

(a) Human Excreta

Safe excreta disposal is an essential element to ensure a harmless environment in the camps. The UNRWA latrine construction programme started with the provision of temporary latrines, e.g., trench latrines, and pit privy latrines for communal use. These were replaced by more sanitary public septic tank latrines at the rate of three slabs per 100 persons with percolation pits for the disposal of the tank effluent.

As the use and the upkeep of communal latrines proved to be difficult and impractical, the family latrine programme was launched. UNRWA contributed the necessary materials for the construction of family latrines such as reinforcing iron bars, cement, slabs and traps. All or most families constructed their own family latrines with or without assistance from UNRWA and most public latrines were eliminated.

(b) Sewage and other Wastewater

Wastewater from the tents and temporary shelters was disposed of in the streets and alleys to end up in the wadis in or nearby the camps. After the construction of the family latrines, wastewater was disposed of in the percolation pits of these latrines. Filled percolation pits are emptied by vacuum tankers and disposed of at places approved by the municipal or Government concerned authorities.

The UNRWA policy is to connect private latrines to sewerage systems in camps which fall within or nearby municipalities served with these systems. Many camps are now served with sewerage systems.

(c) Solid Wastes

Solid wastes generated in the camps, as anywhere else, include many different materials, the amount and characteristics of which differ according to seasonal variation, geographic location and the inhabitants life-style. In general solid waste from the camps includes paper, vegetable and fruit residues, leaves, grass, wood, clothes, synthetics, glass, metal, ashes, sweepings, dead animals, animal manure, bones, food scraps.

A large part of the camp solid waste is putrescible material which attracts insects, provides food for rodents and releases offensive odours:

(1) Collection of Solid Wastes

UNRWA appointed sanitation labourers at the rate of 2.5 labourers per 1000 camp residents to sweep the streets and open spaces daily, collect solid wastes from the shelters, installations, markets and other places and transport them in wheel barrows for disposal in depressions, trenches and pits in and around the camps. They were covered with earth at the end of the day. When such places became unavailable solid wastes were transported by the sanitation labourers to small incinerators in the camps or by mule carts a few kilometers from the camps where they were dumped in the open. Some farmers used the solid wastes as fertilizers. Low temperature burning was used, but on many occasions this was not possible as solid wastes were wet in winter and a fire hazard in summer. Disposal sites became fertile places for fly breeding and a nuisance to the camps and the neighbouring residential areas.

Sanitation labourers used solar oil and kerosene for burning the refuse dumped near the camps. After burning, the metal tins were raked, flattened and buried to clear the site and to prevent mosquito breeding. Because of the lack of disposal sites within or nearby the camps, vehicles were used to transport solid wastes from collection (transfer) points located in the camps to municipal dumps.

Solid wastes in the collection points are uncovered, attract insects and rodents, release offensive odours and are eyesores. Collection points are resented by the camp residents, especially those living nearby. In some camps, solid wastes are collected in containers from 1 to 12m^3 capacity.

Due to overcrowdedness and lack of open spaces, the number of refuse collection points has been decreasing and sanitation labourers have to transport solid waste long distance and some of them overload their wheel barrows/hand carts to decrease the number of trips.

With the improvement of the conditions in the camps, the sanitation labourer norm was gradually decreased to 1.4 to 1.5/1000 camp residents with additional labourers authorized for special factors that have an effect on environmental health.

(2) Storage of Solid Wastes

Camp residents place solid wastes loose in metal or plastic containers. Full containers are placed outside the shelters and are emptied by UNRWA sanitation labourers. Bins used are about 15 to 20

litre capacity, adequate for one or two days. If more solid wastes are produced, more bins may be used or refugees can deposit the contents at the nearest collection point.

Camp residents are advised to place solid wastes from the kitchens in the paper or plastic bags they get when shopping to facilitate refuse collection and to keep bins clean.

(3) Solid Waste Transportation

Solid wastes at the collection points are loaded manually or mechanically into solid waste vehicles. Elevated platforms are built to make manual loading easier.

Filled solid waste containers are transported and emptied at municipal dump sites and returned to the camps by special lifter vehicles. Trolly containers of $1m^3$ capacity are mechanically emptied in refuse compacting trucks.

Solid wastes are transported by UNRWA, contracted or municipal vehicles and dumped at dump sites approved by the concerned government and/or municipal authorities where they are burnt in the open and buried using bulldozers and other machines and sites are sprayed with pesticides for insect and rodent control.

2.2.3 Surface Water Drainage

(a) Rain Water Ditches

The drainage of storm water has been of concern to UNRWA since the establishment of the camps. Refugee tents and shelters were placed as far as possible from flood zones and natural water courses. Drainage of storm water was necessary to protect the refugee tents, shelters and installations, to prevent building flooding and road erosion and to eliminate water ponding. Refugee tents and shelters were threatened by flooding on many occasions in the early years following the establishment of the camps.

In the beginning, the refugees dug earth ditches around their tents and shelters to divert the rain water. Emergency teams of sanitation labourers and other volunteers, equipped with the necessary tools and protective clothing, toured the camps digging and clearing drains, ditches and culverts and giving necessary help to the refugees.

(b) Concrete Surface Water Drains

In the years following the establishment of the camps, concrete open surface water drains were constructed around central installations, alongside main asphalted roads and in limited areas in the camps. Their function was to drain and divert rain and waste water from the water distribution points and the refugee shelters to the nearest natural rain water course. The slope of the drains was dictated by the topography of the camps but not less than 0.5%. Wedge-shaped concrete surface drains were extended to other areas which were subject to flooding and ponding (Fig. 3).

(c) Self-Help Project

The increase in the water consumption in the camps resulted in an increase in the wastewater and the saturation of percolation pits of the family latrines and the need for frequent voiding. To avoid paying for the voiding of the percolation pits, some camp residents emptied the contents of their percolation pits onto the streets and alleys creating wastewater ditches which released offensive odours and became a threat to health.

The construction of sewerage systems with treatment facilities was and still is beyond UNRWA's financial capabilities. However, UNRWA launched a project for the pavement of roads and pathways with concrete and the construction of concrete surface drains for the drainage of rain water and harmless wastewater.

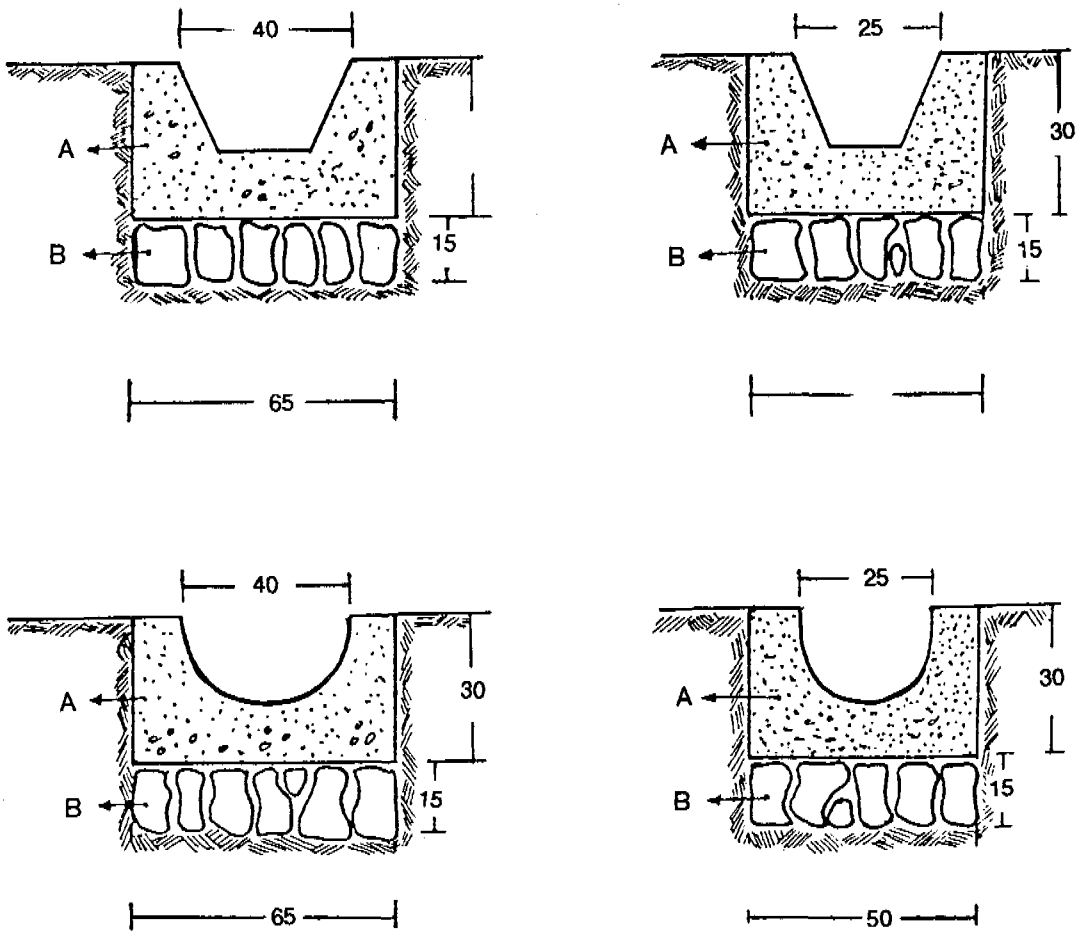
UNRWA coordinates the project with the concerned municipal and government authorities, the camp residents and their representatives. UNRWA provided the necessary construction materials e.g., cement, sand, aggregates and stones for the pavement of roads and pathways and the residents in cooperation with government authorities paid for the cost of labour. The project has been welcomed by the camp residents and now it has covered or is progressing in all camps.

2.2.4 Insect and Rodent Control

The conditions in the camps favoured a rapid increase in the numbers of insects and rodents and consequent exposure of the refugees to the diseases transmitted by them. The initial steps taken in the early days of the camps were directed towards insect and rodent control by physical and chemical means followed by sanitary waste storage, collection and disposal, and personal hygiene.

Fig. 3

Sample Sections of Surface Drain Channels



A. Concrete

B. Rock Bed

Not to Scale

Dimensions in centimeters

Adapted from UNRWA's Technical Drawings

The objectives of insect and rodent control are to eliminate their breeding places by maintaining a clean environment, to prevent their access to food and water, and to apply insecticides and rodenticides to their breeding and gathering places. The commonly encountered insects and rodents in the camps which are of medical importance are: flies, lice, fleas, bedbugs, cockroaches, mosquitoes, mice and rats.

(a) Houseflies

The housefly is found almost everywhere and it lives close to man and his environment. The housefly life cycle may be completed in one week to two or more months depending on temperature and environmental conditions. Apart from being a nuisance, the housefly can be a vector of many diseases such as typhoid, paratyphoid, dysentery, cholera, diarrhoeal disease, worms, trachoma and food poisoning.

Since the beginning, UNRWA's concern was to control flies by the most effective method, the elimination of breeding places by proper sanitation aimed at breaking the life cycle, by adopting sanitary storage, collection and disposal of organic wastes.

Living conditions in the camps and the primitive methods of refuse storage, collection and removal necessitated the application of insecticides. A variety of insecticides have been used for outdoor fly control, e.g., D.D.T, Dimethoate, Baygon, Alfacron, Coopex and Ranax. Hand-operated compression sprayers are used in all camps. Labourers who participate in insect control activities are provided with protective clothes.

(b) Human Lice

The human louse is a small wingless ectoparasite which feeds by sucking mammal blood. Apart from the unpleasant infestation and the irritation caused by the louse bites when sucking the blood, the louse is an important vector of some serious human diseases, the most important being epidemic typhus and relapsing fever.

In the early camps, overcrowded conditions and the lack of facilities for personal hygiene favoured lice breeding. Lice infestation was so common that it necessitated control campaigns in the camps. Individual's clothes and bedding were dusted using 1% Gammexan Anti-Louse Powder and 10% D.D.T. at the rate of about 60 to 100 grams per person. Some refugees boiled their clothes, exposed them to the sun's heat, washed their hair with hot water containing kerosene. Public bath houses were constructed to provide bathing facilities, with hot water and soap, to limit infestation.

At present, lice infestation is limited, being encountered only among young school children. Control measures include health education especially at schools with emphasis on personal hygiene, frequent bathing with hot water and soap, laundering clothes with detergent, the use of separate combs and hair brushes, shaving or cutting the hair and the use of anti-louse shampoo for infested hair.

(c) Fleas

Fleas are small, wingless, active insects that feed on the blood of warm-blooded animals. Fleas are vectors of two serious diseases, plague and typhus. Flea infestation was a major problem in the refugee camps in the early years following the establishment of the camps. Overcrowding and the lack of washing and personal cleaning facilities were ideal for the spread of fleas among the refugees. Flea control campaigns were organized and executed. Tents and temporary shelters were sprayed with DDT and malathion. The inhabitants were requested not to sweep or dust off the insecticides. Pets were few in the camps but when encountered, they were dusted also. Follow-up selective flea control continued for many years.

Cement was issued to the refugees to pave their tents and shelters to eliminate hiding places and facilitate cleaning.

As a result of the improvement in living conditions and housekeeping, regular sweeping and cleaning gave no opportunity for eggs and larvae development and flea infestation in the camps has not been reported for many years.

(d) Bed Bugs

There is no evidence that bed bugs are vectors of diseases. The bed bug bite causes discomfort, irritation and pain and in some cases it may cause severe skin inflammation, as well as embarrassment and distress to the human host.

In spite of the living conditions in the camps, the ill-constructed shelters and the use of second-hand furniture, which favours the breeding and the spread of bed bugs, there have been no serious infestations in the camps. The reported cases of bed bug infestation are still effectively treated with Diazinon at the rate of 40 to 80 grams per room (10 to 12m^2) with special attention to cracks, crevices, wooden furniture, frames, etc. Shelters adjacent to infested shelters are also treated to prevent the spread of infestation. Windows and doors of treated shelters are kept closed for one or two days. The inhabitants are requested to check carefully second-hand furniture and luggage, and to report immediately the discovery of bed bug infestation.

(e) Cockroaches

Cockroaches are closely associated with man. They are found near food stuff, in the kitchens, under sinks, cupboards and in sewers. Cockroaches feed on any edible thing. Apart from their possible ability to transfer disease, cockroaches have a disgusting appearance, unpleasant odour and they contaminate food.

Limited cockroach infestation in the camps was observed in the shelters, behind the lining of the temporary shelters, in latrine manholes, drains, kitchens and cupboards in the market areas. No major chemical control measures were taken against cockroaches because of their minor role in disease transmission and their proximity to food stuff where chemicals may contaminate the food in the primitive camp kitchens.

Emphasis is on environmental control, e.g., eliminating cracks and crevices, cleaning and proper housekeeping, and waste storage, collection and disposal. Outdoor infestation is occasionally treated with Dimethoate 40%.

(f) Mosquitoes

Mosquitoes are widespread and well known to most people. Female mosquitoes are important vectors of serious diseases, e.g., malaria, yellow fever and filariasis. Malaria once was prevalent in some areas in UNRWA's fields of operation.

The UNRWA role is limited to eliminating potential breeding places within the camps by ensuring that water reservoirs are mosquito proof, draining surface water, regular maintenance of public latrines and percolation pits and solid waste removal with proper disposal of empty containers.

(g) Rodents

Rodents are spread worldwide. They cause serious economic losses to man by feeding on seeds, grains, plants and animals. They have swimming, running and climbing abilities. The most important and dangerous rodents from the public health point of view are mice and rats. Mice and rats are capable of transmitting several dangerous diseases, e.g., typhus, rabies and tapeworms.

Mice are encountered in all camps. They are found in dark quiet corners, in clothes bundles, in boxes, shops, stores, and in holes in walls, etc. Rats are encountered in camps located in or nearby large cities. The use of rodenticides in camps is not safe as there is the possibility of accidental poisoning of man and his domestic animals. Therefore, trapping is the only practical method for mice and rat control in the camps. The inhabitants are advised on how to keep their shelters rat proof as much as possible and to keep food and water away from rats.

2.2.5 Ancillary Facilities

Bearing in mind the temporary nature of the camps and the conditions in the early years, other sanitation facilities had to be provided to maintain personal cleanliness and to prevent the spread of diseases. There was a need for bath houses, animal slaughter places and stores in all camps.

(a) Bath Houses

Living conditions in the tents and other primitive accommodations made it necessary to construct bath houses to enable the camp inhabitants to have a hot bath at least once a week to maintain their personal hygiene.

In small camps, one bath house containing ten showers was built to be used by each sex on three separate days a week. In large camps two separate bath houses were built, one for each sex. Hot and cold water was available daily, soap was also provided. Towels, combs, brushes and other toilet articles were provided by the refugees themselves.

The improvement in the living conditions in the camps resulted in a decrease in the number of bath house users and the number dropped to a level that bath houses were closed and phased out.

(b) Slaughter Houses

The animals slaughtered in the camps were largely sheep and goats, some cows and occasionally camels. Transportation of the carcasses from the slaughter house to the butcher shops was done by primitive, unsanitary means. Butcher shops in the camps were of a low standard and lacked many essential sanitary facilities.

Facilities for slaughtering animals were constructed to enable butchers to slaughter animals for daily consumption. Adequate water was supplied and percolation pits were provided for the disposal of blood and wastewater.

(c) Sanitation Stores

In each camp, there is a place to store equipment, tools and supplies used for various environmental health activities. These are ordered from the UNRWA main warehouses. All supplies received and consumed in the camps are recorded and returns are submitted.

3. PROVISION AND MAINTENANCE OF ENVIRONMENTAL HEALTH SERVICES

3.1 Water

3.1.1 Water Sources

Water is divided into four categories according to source:

(a) Rain Water

Originally free from contamination, it might be contaminated by certain gases, dust and other matter in the atmosphere. It might be contaminated when it comes in contact with the ground where there is organic matter and human and animal wastes. It should be collected properly to reduce contamination.

(b) Surface Water

This is the water drawn from streams, rivers, lakes and pools. In general, surface water is exposed to all kinds of contamination and, therefore, it should be treated before use for domestic purposes.

(c) Ground Water

This is the rain and surface water which permeates the layers of the ground and comes out from springs and wells. Ground water is generally safe as it is filtered while permeating through the soil and suspended matter and germs are removed. The chemical quality is not always suitable for human consumption.

(d) Sea Water

This is an unconventional source of fresh water for domestic use which requires high energy for desalination and only wealthy oil-producing countries are depending on it. It may be contaminated with sewage, industrial wastes, oils and salts.

3.1.2 Water in Camps

The UNRWA objective in cooperation with the host governments is to supply camp residents and installations with safe and wholesome water, in reasonably adequate quantities, easily accessible to the user and free of charge. However, camp residents pay for their own private connections to the public water system when such a system is provided in or nearby the camp.

Water from the reservoirs in the camps is distributed through water networks to the installations and public distribution points available in all sectors of the camps.

(a) Water Reservoirs

Water reservoirs in the camps were constructed on high spots to provide gravity distribution throughout the system. Unauthorized persons and animals are not allowed access to water reservoir area.

Water reservoirs are covered to prevent dust and provided with manholes for inspection, cleaning and maintenance. Overflow and washout pipes should face downward and be covered with screens to prevent pollution from dust, insects, birds and rain water. Outlet pipes should be located higher than the bottom of the reservoir to prevent sediment from entering the system network. Water reservoirs are to be cleaned, washed and disinfected twice a year using clean new brushes and protective clothing. They are to be inspected regularly to ensure that they are properly protected against pollution. Residual chlorine in the water reservoirs should be maintained at 0.5 to 1.0 mg/l.

(b) Water Distribution

Water is distributed through 1/2 to 4 inch galvanized water pipe networks to all sectors of the camps. Standard water points have four to six taps (Fig. 4), each tap serving 200 to 250 persons, and water points are not more than 300m from the farthest shelter. To avoid congestion and conflicts at the water points, the number of points was increased using one to two taps per point instead of four to six taps.

Sanitation foremen assisted by water supply attendants and plumbers are responsible for water distribution and maintenance of water networks in the camps. They should ensure that water pipes do not pass through or near sources of pollution such as latrines, percolation pits, wastewater drains and ditches.

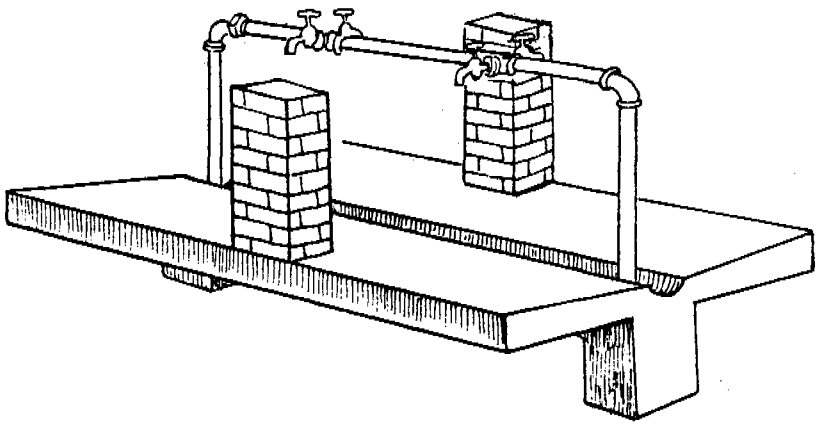
Sanitation foremen are to look for water leakage and corroded pipes, which should be repaired and replaced immediately. Inhabitants' complaints, abnormal drop in residual chlorine level and pressure are indicators of change in water quality.

(c) Purity of Water

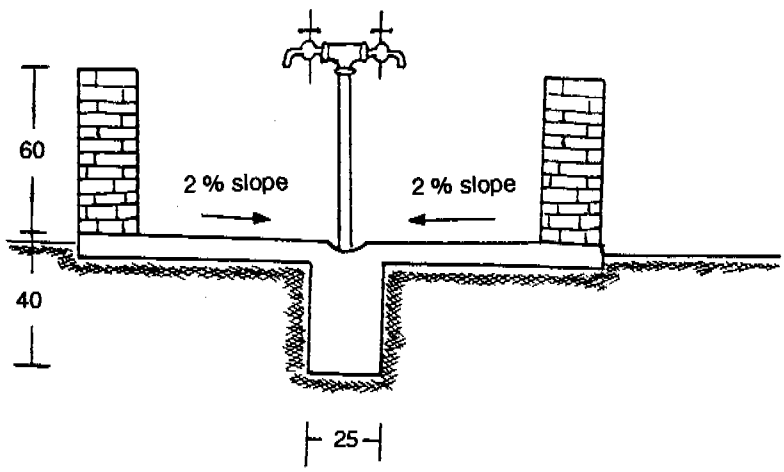
All water supplied to the camps is normally from safe sources and chlorinated up to a residual chlorine of not less than 0.5 mg/l. To supply the camp residents with safe and wholesome water, the following points are to be noted:

(1) Drinking water should be colourless and free from objectionable taste and odour.

Fig. 4
Sample Public Water Point



Isometric



Section

Not to Scale

Dimensions in centimeters

Adapted from UNRWA's Technical Drawings

(2) Water should be safe from source to distribution points to consumers.

(3) Chlorine residual is to be measured daily at various locations to ensure the availability of adequate residual chlorine.

(4) Bacteriological examination should be carried out regularly to cover all points.

(5) Pipe fittings, connections and unions are to be checked for leakage and possible contamination.

(6) Stop cocks are to be checked as above and adequate space between the stop cocks and the ground should be left to avoid the entry of leaked water into the system through the stop cocks.

3.2 Wastes

Accumulation of waste favours breeding of vectors and the transmission of pathogens. It is offensive to the eye and nose, and it may contaminate water sources and the soil.

Waste in refugee camps includes the following:

1. Human excreta
2. Liquid wastes (sewage and wastewater)
3. Solid wastes.

3.2.1 Human Excreta

There are two methods for excreta disposal:

With water carriage, where excreta are carried by water through sewers to treatment plants and disposal facilities.

Without water carriage, where excreta are stored in pits or tanks and when these are full they are dumped or voided.

When planning a latrine programme, the disposal facilities should be:

- Cheap to construct and maintain.
- Durable and easy to clean.
- Suitable for weather conditions and local customs.
- Made of cheap and locally available materials.
- In a suitable location accessible to users.

The latrine which meets all or most of these requirements is to be selected for excreta disposal.

(a) The following latrines have been used and can be considered for refugee camps.

(1) Pit Latrine and Ventilated Improved Pit Latrine (Fig. 5)

A pit is dug in the ground and allows water to permeate through the soil. It should be deep enough to allow minimum light to discourage fly breeding. A slab is placed on top of the pit and a super-structure is built or installed to provide privacy and protection to the user and to keep away flies.

The contents of the pit should not reach water sources and when full, the slab and other movable parts may be transferred to another pit.

Traditional pit latrines have two main disadvantages: bad odour and insect breeding. A better type, the ventilated improved pit latrine (VIP), has a vertical vent pipe with a flyscreen at the top which reduces the possibility of odour and fly breeding. The VIP latrine is also easy to construct with local material and is socially acceptable as any type of cleansing materials can be used.

(2) Aqua-privy (Fig. 6)

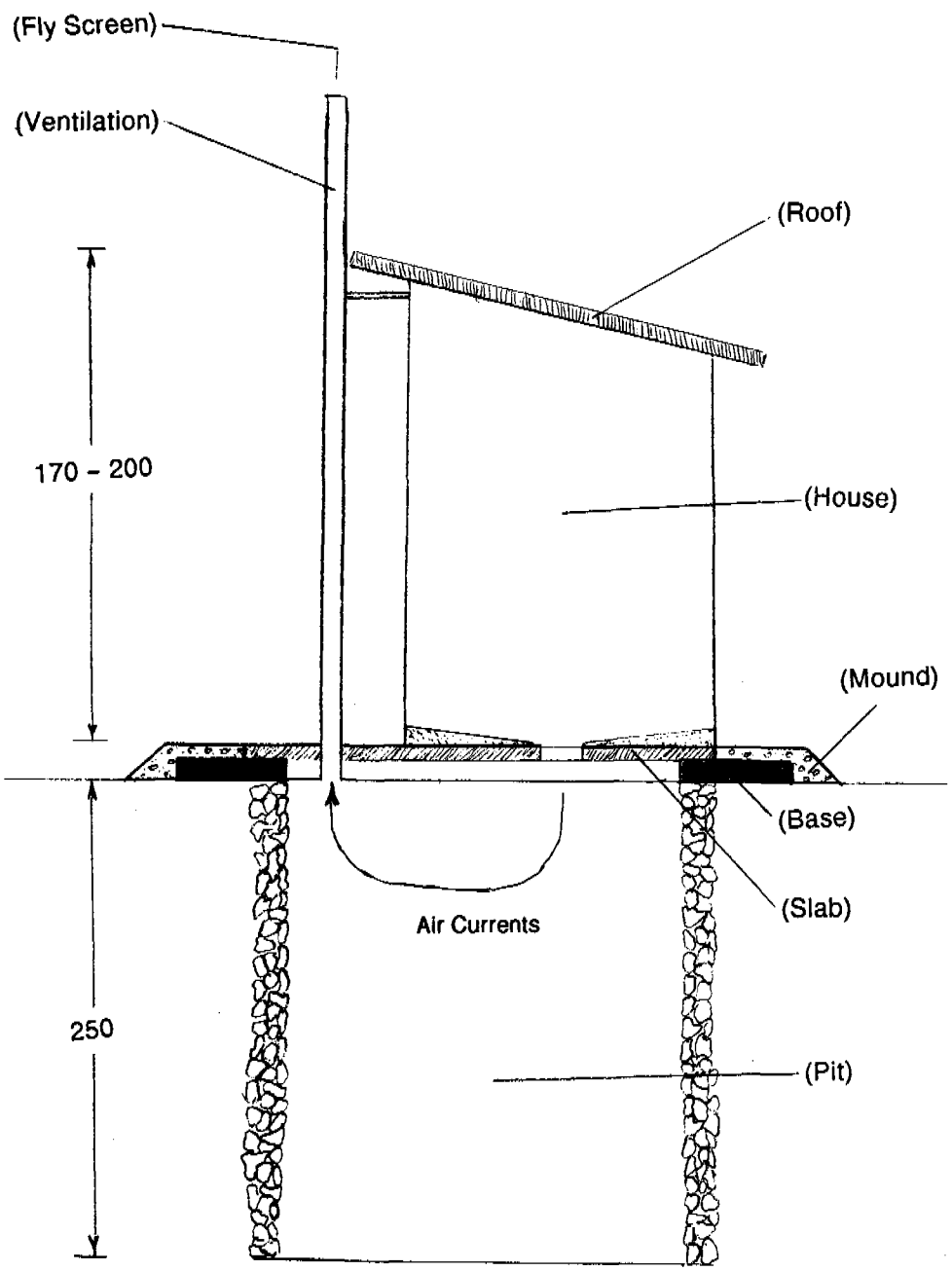
The excreta deposited in a water-tight tank which is full of water are anaerobically decomposed and volume reduced. The effluent runs to percolation pits. The drop pipes fitted to the latrine slabs and submerged in the water in the tank are to prevent insects gaining access to the tank and to seal off offensive odours. The anaerobic decomposition reduces excreta to:

- Liquid products as an effluent for subsequent disposal in the percolation pit
- Solid residues (sludge) which settle to the bottom of the tank
- Floatable scum rising to the surface of the water
- Gaseous products which escape through the ventilation pipe.

The tank should be de-sludged when the solid materials reach the height of one half the depth of the tank. The tank should be refilled with water after de-sludging and scum should be removed regularly.

Fig. 5

Ventilated Improved Pit Latrine (VIP)



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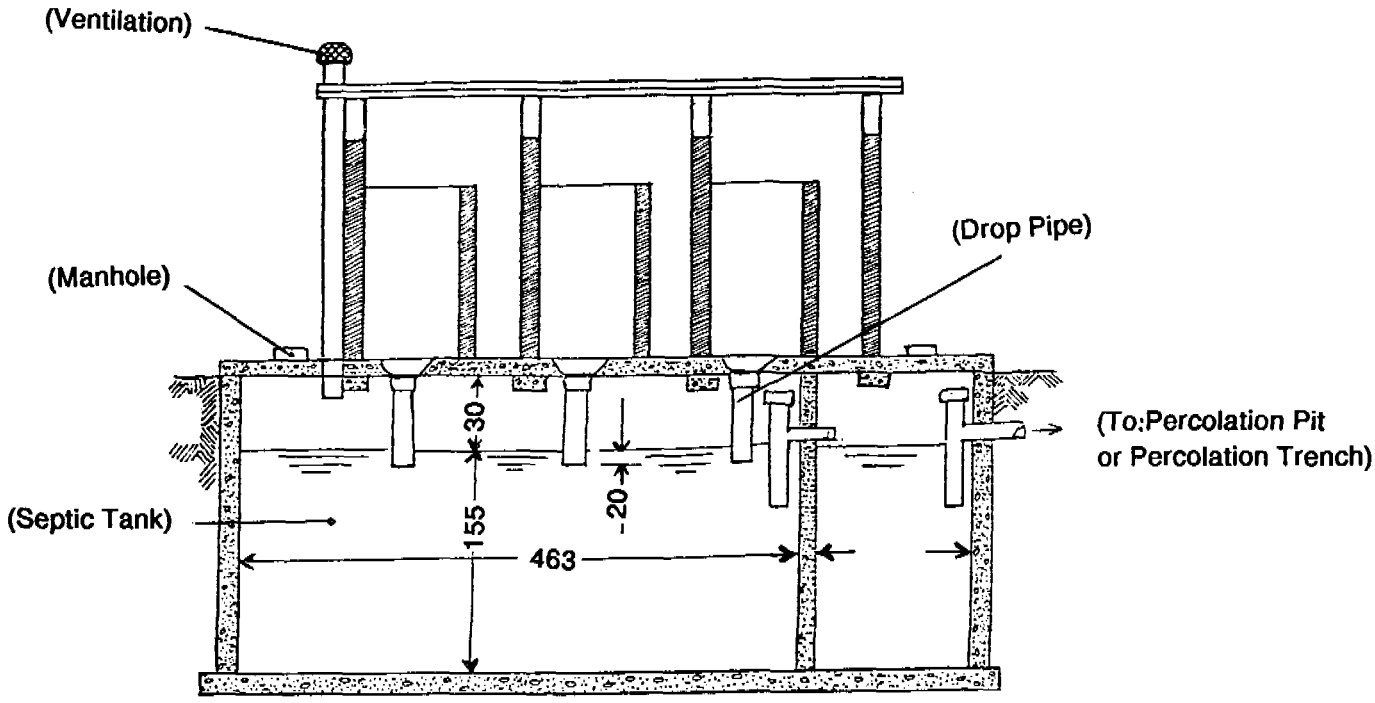
Adapted from TAG Technical Document No. 13

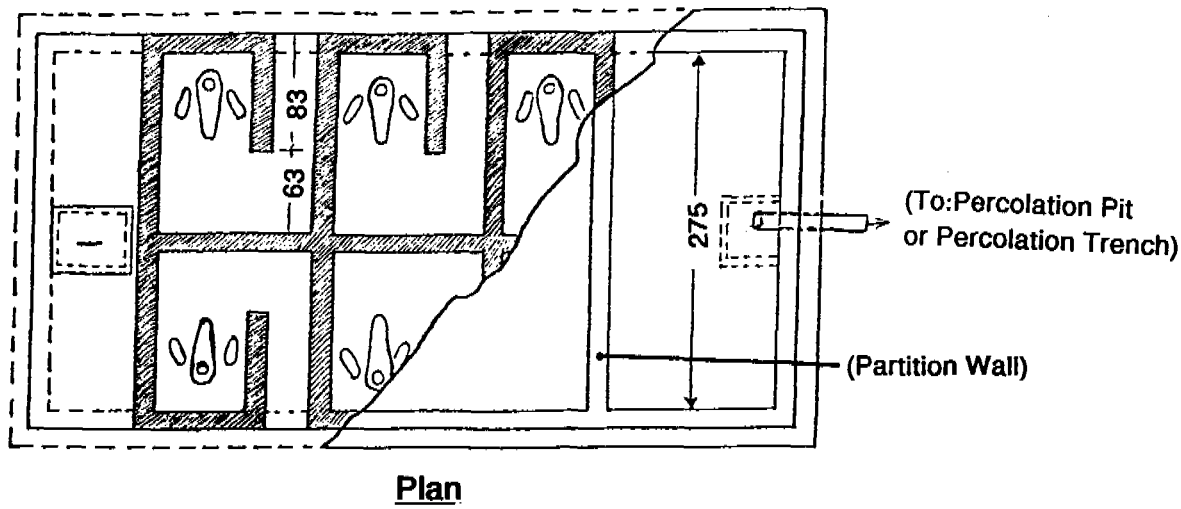
Dimensions in centimeters

Fig. 6

Aqua-privy Latrine



Sectional ELevation



Plan

Not to Scale

Dimensions in centimeters

Adapted from UNRWA's Technical Drawings

(b) Other latrines may be used in specific situations.

(1) Chemical Latrine (Fig. 7)

It is composed of a metallic cylindrical water-tight tank full of water with caustic soda or other such chemicals dissolved in it. Organic matter is decomposed chemically and pathogens are destroyed. This is a sanitary latrine, but expensive to construct and operate.

(2) Bucket Latrine (Fig. 8)

It is a bucket (pail) placed under a latrine seat or slab hole to be emptied when full. Some materials such as saw dust are added to minimize offensive odour.

This latrine is not recommended because excreta are stored and not disposed of, and it requires repeated removal causing offensive and potentially hazardous conditions.

(3) Trench Latrine

It is a trench dug in the ground where excreta are covered with earth after use. The trench is filled with earth when half full. This is an insanitary latrine used in limited conditions.

3.2.2 Liquid Wastes

Liquid waste in camps is the wastewater emanating from latrines, kitchens, and water used for washing, rinsing and cleaning. If liquid wastes are not properly disposed of, water sources, human food and the environment may become contaminated, favour insect breeding (especially flies and mosquitoes) and consequently the spread of diseases in addition to offensive sights and odours. Sewage and wastewater may be disposed of as follows:

(a) Camps without Sewerage Systems

(1) Surface Application (Fig. 9)

Relatively harmless wastewater, e.g., from rinsing hands, vegetable and fruit washing, water wasted at public water points, etc., may be disposed of by sprinkling on unpaved streets and open spaces to evaporate and dry up. In areas where streets are paved, this wastewater may be diverted to the concrete surface drains leading to the wadis (low areas) near the camps and away from inhabitants. This wastewater should not contain human excreta and not be allowed to stagnate. The surface drains should be regularly cleaned and scraped and should not be used for solid waste disposal.

Fig. 7
Chemical Latrine

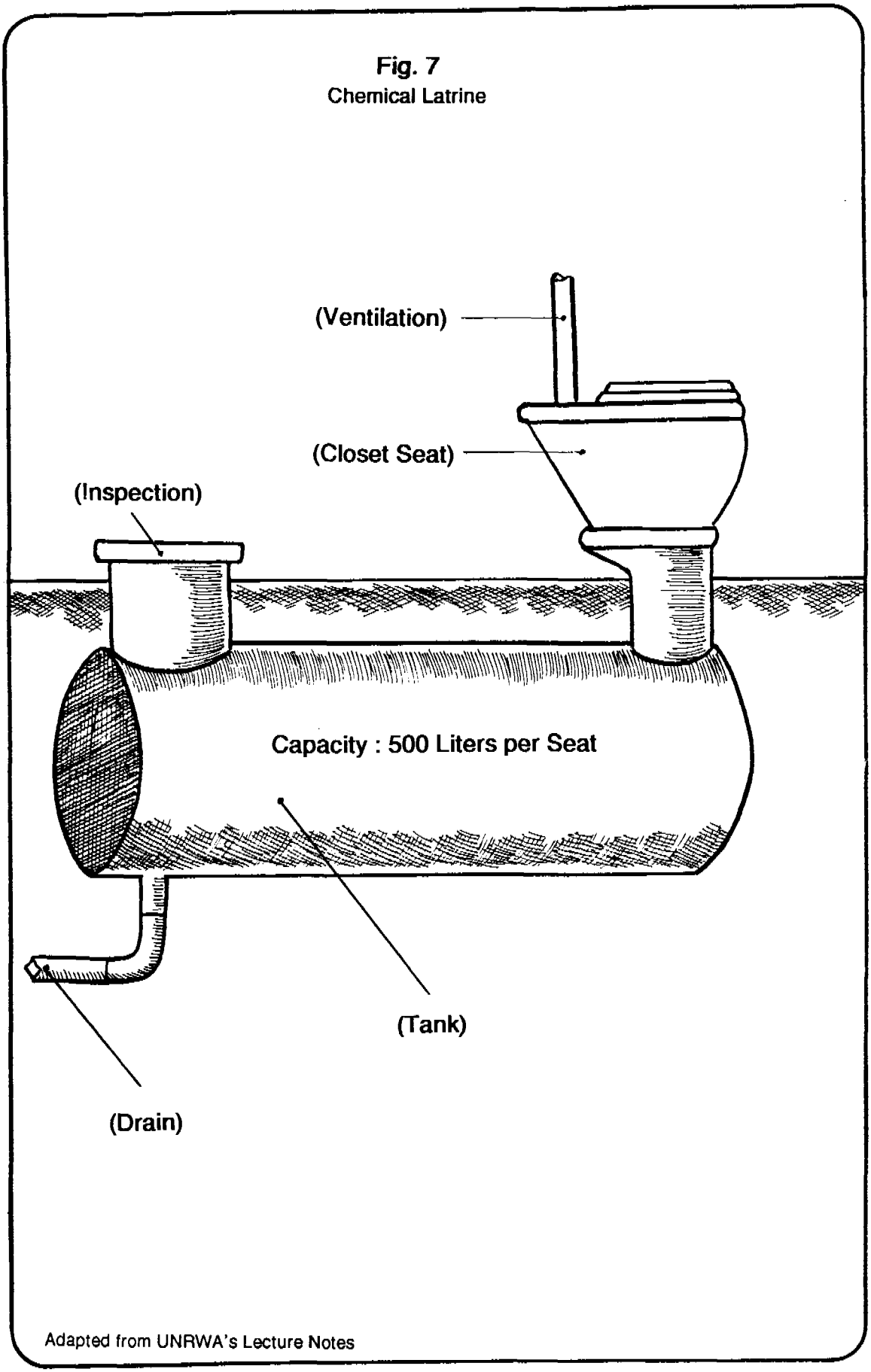


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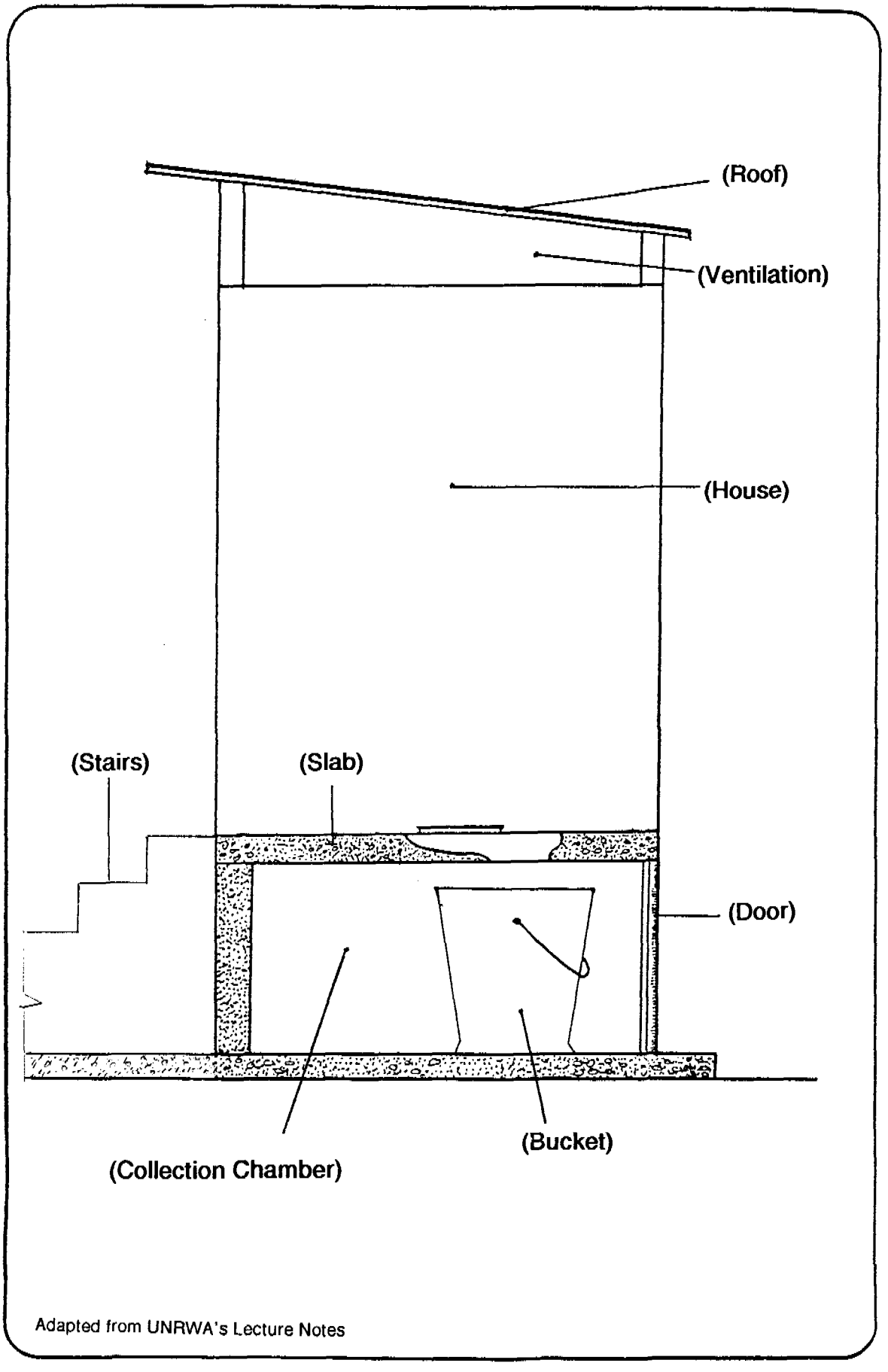
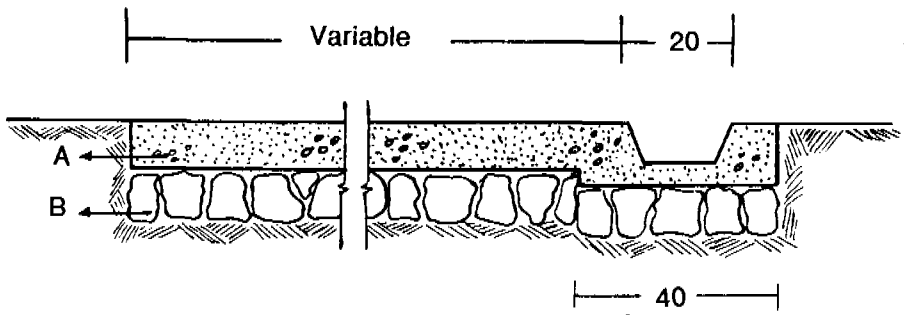
Fig. 8
Bucket Latrine



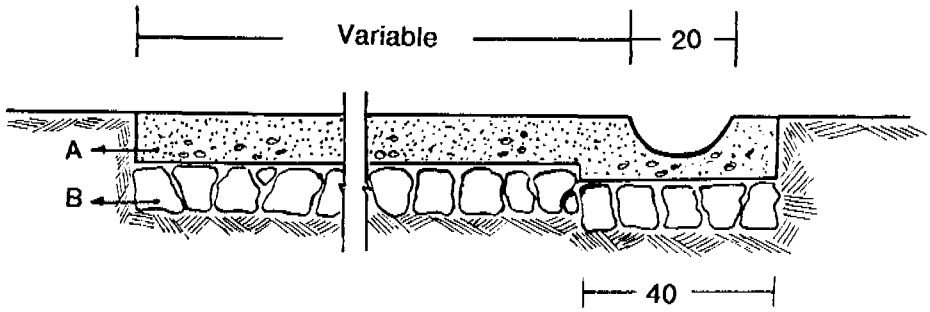
Adapted from UNRWA's Lecture Notes

Fig. 9

Sections for Some Surface Drainage Channels



1. Section for Path with Trapezoidal Channel



2. Section for Path with Semicircular Channel

A. Concrete

B. Rock Bed

Adapted from UNRWA's Technical Drawings

Dimensions in centimeters

(2) Percolation Pits (Fig. 10)

Wastewater containing human excreta should be disposed of into the percolation pits of the family latrines which are available in all shelters in the camps. The percolation pit is a round, or square, pit dug in the ground where latrine effluent runs into the pit and permeates into the ground. In loose soils the side walls of the pits may be lined with rubble stones laid without mortar or cement bricks with openings to allow sewage to reach and be absorbed by the inside walls of the pit. The pits are covered with reinforced concrete roofing with a manhole for inspection and voiding.

The percolation pits should be tightly sealed away from water sources, and rain water is to be diverted away from the pits. The capacity of the pit depends on the quantity of water consumed and type of soil. Pits are to be voided regularly before completely full with special vacuum tankers and disposed of in sewage treatment plants or other places permitted by the concerned municipal or governmental authorities.

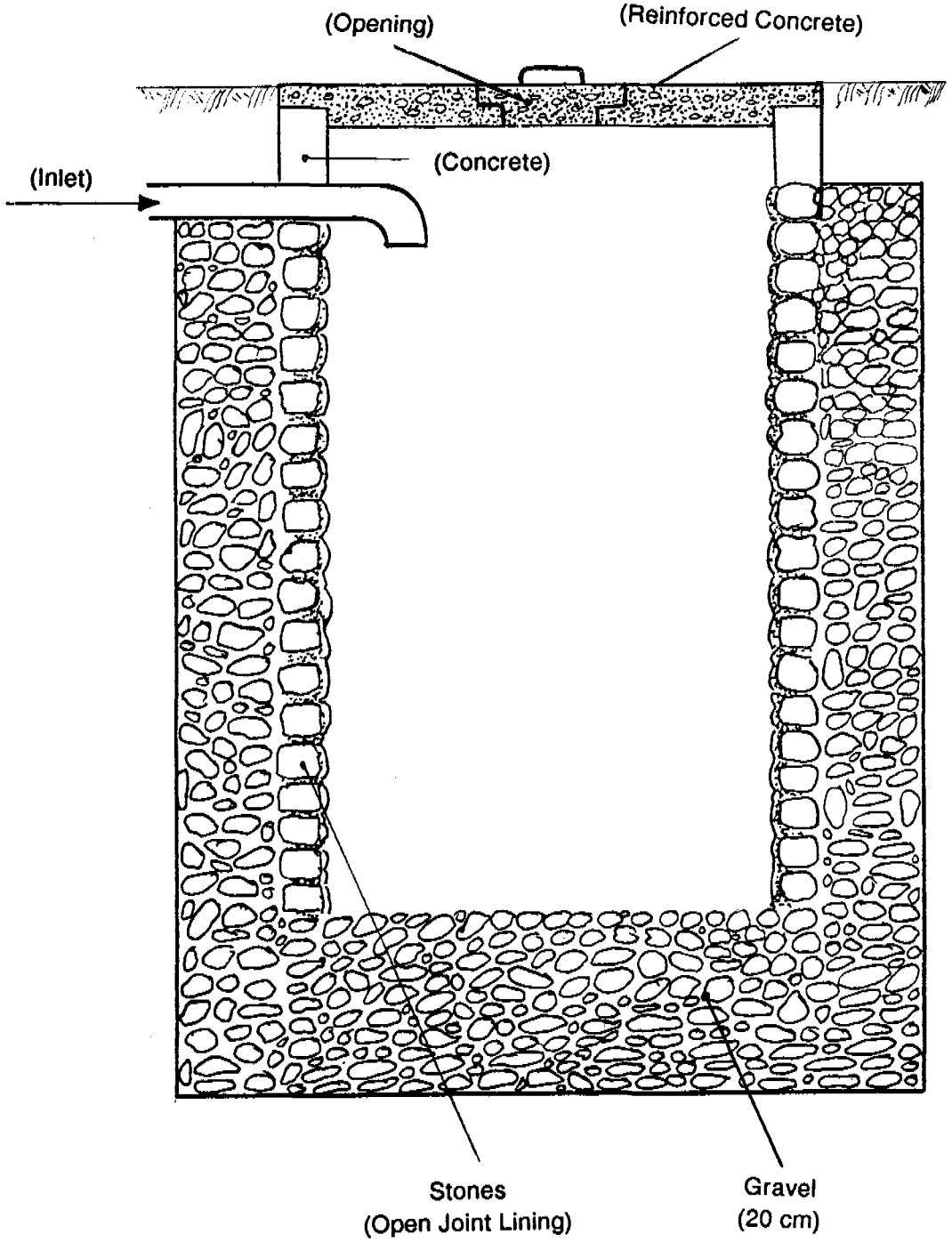
Sewage and wastewater from public latrines and installations, especially schools, are disposed of in septic tank latrines. The effluent of these latrines may contain pathogenic organisms and should run into percolation pits to be voided and disposed of as stated.

Vacuum tankers should have a distinct colour and label. They should be tightly closed, leak-proof, regularly maintained and the contents should not be disposed of in farms or other sites where they may adversely affect water sources and the environment.

(3) Percolation Trenches (Fig. 11)

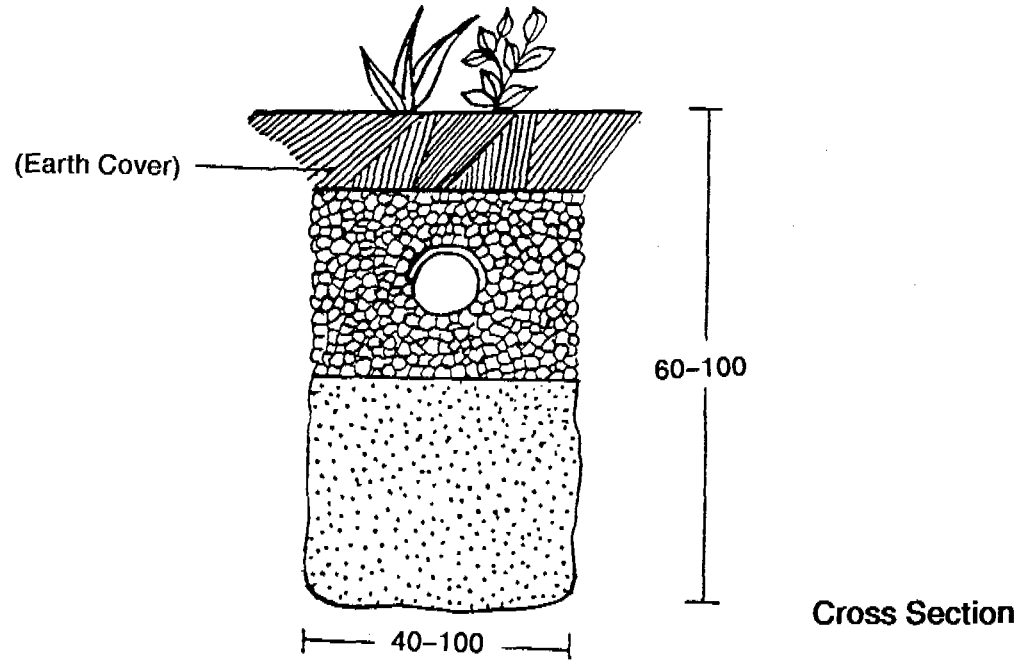
Wastewater from septic tank latrines and/or percolation pits at homes and installations may be disposed of in percolation trenches. The dimensions and the number of trenches are determined by daily water consumption, type of soil, available space and the depth of the ground water. In the trench, wastewater is distributed and purified by the action of the aerobic bacteria within the gravel in the top soil where absorption is high and water reaching the surface of the ground is evaporated and some is absorbed by short-rooted plants or grass.

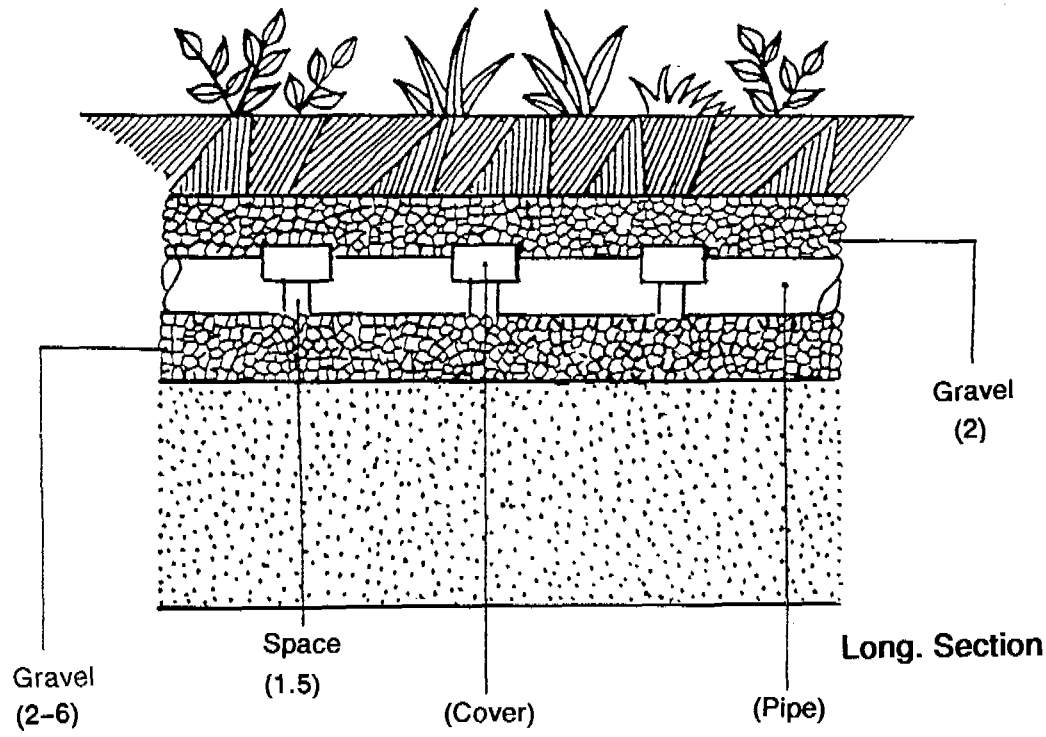
Fig. 10
Percolation Pit



Adapted from UNRWA's Technical Drawings

Fig. 11
Percolation Trench





Adapted from UNRWA's Lecture Notes

Not to Scale
Dimensions in centimeters

Trenches should not be less than 7.5m from big trees and not more than 30m long. Two or more parallel trenches may be constructed. The width of the trench is from 40 to 100cm, and the depth is from 60 to 100cm. A layer of 15cm of gravel (Jouzieh) 2 to 6cm is placed over the bottom of the trench. Pipes 30cm long are laid with loose-joined pipes about 1.5cm apart and at a minimum slope of 0.5%. The upper half of the open space is covered with metallic sheets or tar paper to prevent the entrance of sand which might interfere with the flow of effluent. (Reinforced plastic pipes may be used, sawed to 1/4 of the diameter at 30cm intervals). Then the pipes are surrounded and covered with not less than 5cm of gravel. The rest of the trench is back-filled with earth. A T-shaped pipe is to be fitted to the inlet of the pipeline to prevent scum and other floating materials from clogging the pipes.

The use of percolation trenches for the disposal of wastewater from UNRWA Feeding Centres eliminated the need to frequently void the percolation pits at these centres for many years.

Grease interceptors are to be constructed at feeding and other centres where grease is used to avoid the clogging of the percolation pits and the percolation trenches.

(b) Camps with Sewerage Systems

All wastewater and sewage should be diverted to the sewerage system. Rain water should not run into sewerage systems not designed to receive it.

(1) Traps are to be installed at sinks, kitchens, baths, etc. Traps contain water to seal off offensive odours and gases and prevent insects from gaining access to the sewers while allowing easy passage of sewage. Traps should not have less than a 5cm water seal with no movable parts, projections or pockets, should be easy to reach when blocked and should not be less than 4 to 5cm in diameter. Traps are made of lead, cast iron, chrome or plastic.

(2) The quantity of sewage determines the diameter of the house sewer line; the minimum diameter is 10cm. The slope of the sewer line is to be maintained at 2 to 2.5%. A slope of 1.5% is acceptable for low solids sewage. Bends are to be long, and crosses are to be avoided. Sewer lines are to be well supported, straight and without bends. Sewer lines are made of cast iron, asbestos, cement, plastic or clay.

3.2.3 Solid Wastes

Solid wastes in camps, as anywhere else, include many different materials:

- Kitchen and household wastes, street sweepings, combustible substances such as paper, cardboard, tree branches, and non-combustible substances such as cans, glass, iron, and rocks.

- Market wastes from butcher and other shops.

- Animal manure, dead animals and ashes.

The quantity and characteristics of solid waste differ according to seasonal variation, geographic location and the inhabitants' life style. A large quantity of solid wastes in the camps is composed of putrescible organic matter which attracts and provides food and a breeding environment for insects and rodents.

(a) Solid Waste Collection

Each household, shop, school, etc., should provide one or more containers for the storage of solid wastes. The container should be:

- Made of metal or plastic and easy to carry.

- Cylinder-shaped for easy cleaning.

- With tight-fitting lid to avoid the release of odours and prevent access to insects and rodents and misuse by children and animals.

- Of adequate capacity for the solid wastes produced within 24 to 48 hours at least.

- Placed in a dry place convenient to the collector.

Inhabitants are advised to put kitchen wastes in the paper or plastic bags they get when shopping to facilitate solid waste collection and keep containers clean.

Sanitation labourers sweep the streets and open spaces daily, collect solid wastes from shelters, installations, markets and other places and transport them in wheel barrows and hand carts to collection (transfer) points or containers in the camps.

Transfer points and the surrounding areas are to be kept clean especially in the early morning and after loading. Walls are to be whitewashed with lime. Solid wastes are loaded manually or mechanically in vehicles. Elevated platforms are built to facilitate manual loading.

(b) Solid Waste Transportation

Special vehicles are used for solid waste transportation. If other vehicles are to be used, they should be properly fitted, watertight, easy to clean and covered to avoid solid waste spillage and the release of odours.

Large containers are transported, emptied at dump sites and returned to the camps by special lifter vehicles. Containers of $1m^3$ capacity are mechanically emptied into refuse compacting trucks.

Solid wastes are transported by UNRWA, municipal or contractual vehicles and dumped at dump sites approved by the municipal or government authorities.

A proper record of operation should be kept showing the number and movement of vehicles, capacity, quantity of solid wastes transported, and distance to dump sites, etc.

(c) Solid Waste Disposal

Many methods are used for solid waste disposal which are summarized as follow:

(1) Controlled incinerators may be adopted by urban communities to reduce the waste volume to the non-combustible fractions (glass, metal, rocks). It may be too expensive and requiring more skill than available for camps.

(2) Incineration in depressions or in simple incinerators at low temperature may be practiced in small towns, villages and camps where solid waste quantities are small and can be incinerated away from residential areas without delay. Fuel (kerosene or oil) is added to facilitate incineration.

(3) Sanitary landfill (land disposal) where solid wastes are placed in depressions, trenches and pits prepared for this purpose away from residential areas and covered with about 30cm of earth at the end of the day. Filled areas may be used for parks, playgrounds and for simple construction after 10 years. The final cover is about 60m after reaching desirable grade.

Landfill sites should be protected by ditches to divert rain water and have all-weather access roads. They should be located so as not to contaminate ground water. A landfill area of four to five donums per year is adequate for 10,000 persons. Baling of solid wastes will increase landfill capacity (one donum = $1000m^2$).

(4) For composting, compostable wastes are placed in pits 3 to 4m wide, 2 to 3m deep whose length is determined according to the quantity of solid wastes produced. The pit should not be open for more than 3 to 5 days. Solid wastes are covered with 30cm of earth, and the surface is sealed and controlled for two weeks. Cracks appearing on the surface of the pit should be sealed to prevent emergence of fly or fly larvae.

Solid wastes decompose and become stable because of the action of anaerobic bacteria. The heat produced by the decomposition process kills the pathogenic organisms. The contents may be used as a fertilizer after four or more months.

Dead animals are to be buried or burnt. Precautionary measures are to be taken to avoid soil contamination if animals are diseased.

It is important to dispose of solid wastes in a manner that prevents health hazards, otherwise they will decompose and ferment and become accessible to insects, rodents and other animals and contaminate water sources.

3.3 Norms for Provision of Water and Wastewater Services in Camps

3.3.1 Water

(a) In Camps

Water is supplied to camp inhabitants through the UNRWA water network to public water distribution points available in all sectors of the camps provided that the distance between the water point and the farthest shelter does not exceed 300m.

Each tap on the water points serves 200 to 250 persons, and the average daily per capita consumption from the network ranges from 10 to 20 litres.

(b) In Schools

For drinking purposes, schools are provided with taps at the rate of one tap for each 50 students.

Schools are supplied with water for drinking and cleaning purposes as follows:

(1) Schools without Sewerage Systems

- Three litres per student per day for long study day
- Two litres per student per day for short study day (two shifts)

(2) Schools with Sewerage Systems

- Seven litres per student per day for long study day
- Four litres per student per day for short study day (two shifts)

(c) Feeding Centres

- Four litres per beneficiary per day for the first 500 beneficiaries
- Two litres per beneficiary per day for the second 500 beneficiaries
- One litre per beneficiary per day for additional beneficiaries

(d) Milk Centres

- Two litres per beneficiary per day for the first 500 to 1000 beneficiaries
- One litre per beneficiary per day for additional beneficiaries

3.3.2 Latrines

(a) Public Latrines

	Length (cm)	Width (cm)	Depth (cm)	Persons Served
Trench latrine	120	30	60	25
Pit latrine (2 Seats)	160	80	250	70
Aqua Privy (2 Seats)	170	140	150	70

(b) School Latrines

- One seat per 30 female students
- One seat per 50 male students
- One meter urinal per 50 male students

4. WATER SUPPLY MONITORING

The objective of monitoring is to insure safety, smooth operation and absence of sanitary defects or health hazards, and to take the necessary measures for correction within the established norms and procedures.

4.1 Sanitary Surveillance of Water Supplies

4.1.1 Objective

Surveillance requires a continuous and systematic programme of surveys carried out at different points of the water system. The main purpose is to ensure the safety and acceptability of drinking water supplies. Secondary objectives include identification of sources of contamination, assessment of treatment processes including disinfection and determination of trends in drinking water quality.

4.1.2 Sanitary Inspection (Fig. 12)

Sanitary inspection is intended to provide a range of information and to locate potential problems. The data obtained may identify failures, anomalies, operator errors and any deviation from normal. The inspections are to be carried out properly at appropriate regular intervals. The inspector should know how to detect problems and suggest solutions. The frequency of sanitary inspection depends on a number of factors such as population, level of activity and sources of water.

Routine inspections are visits made with a defined frequency in accordance with a previously established plan. Non-routine inspections will also be necessary in the case of a new water source and in emergencies.

4.1.3 Sampling Programme

(a) Objectives

The objective of sampling is to determine the quality of the water at a public tap or a user's dwelling. The quality of water in any storage tank is the responsibility of the owner and occupants of the dwelling; such responsibility should be guided and encouraged by the inspector.

(b) General Criteria for the Selection of Sampling Points

(1) Samples should be representative of the different sources of water entering the system.

Fig. 12

Check List for Sanitary Inspection

A. Storage reservoirs

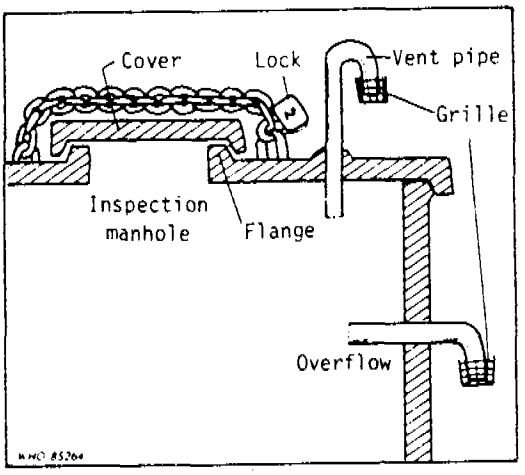
Does the reservoir have an inspection hole ?

Is the inspection manhole protected by a cover and a lock ?

Do the outlets of the vents and overflow pipes face downwards ?

Are the vents and overflow pipes protected by grilles ?

Is rainwater prevented from entering the reservoir ?



B. Distribution networks

Is the distribution system free from leaks ?

Is pressure maintained continuously throughout the system ?

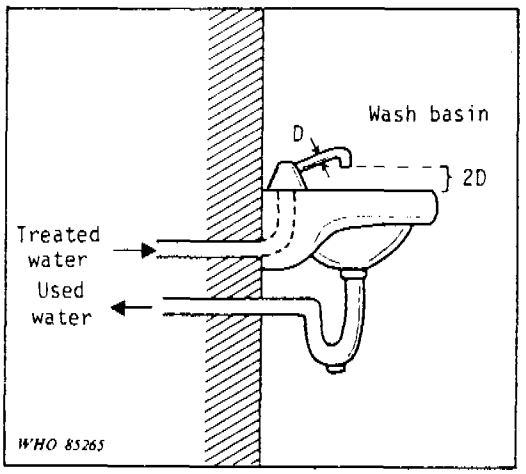
Are cross-connections with poor quality water absent ?

Have any new repaired mains been disinfected ?

Is residual chlorine present at the various points of the system ?

Is the system free from back-siphonage problems ?

Are there any plumbing regulations related to back-siphonage ?



C. Chlorination

Is the chlorination being carried out at the time of the inspection ?

Is chlorination carried out continuously ?

Is the chlorination equipment functioning correctly ?

Is the contact time 30 minutes or more ?

Is there a sufficient reserve of chlorine or chlorine-releasing substance to last for some time to come ?

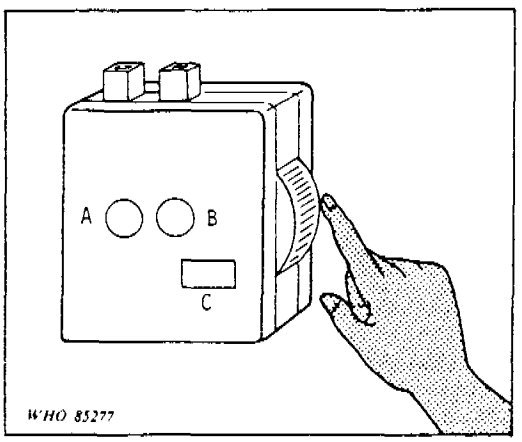


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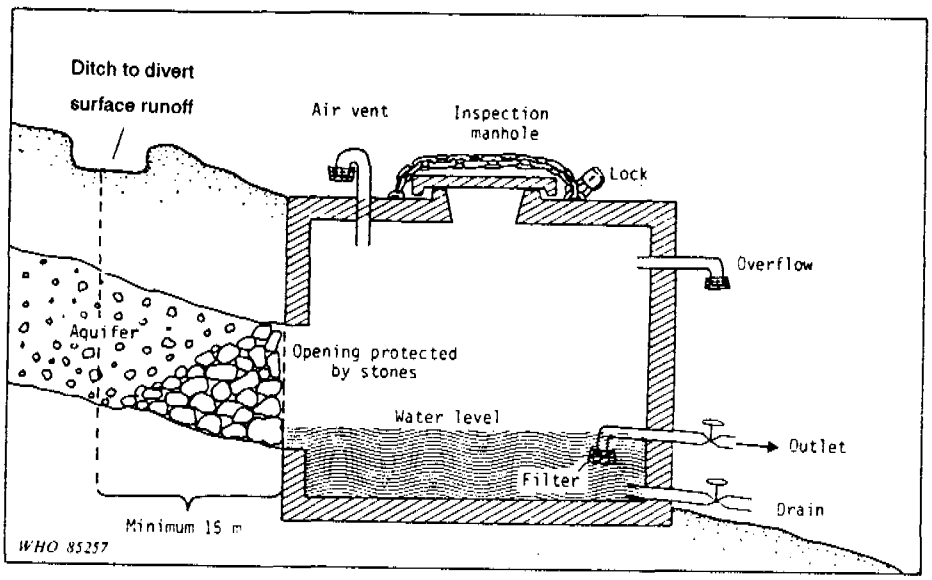
Fig. 12 (Continued)



D. Springs

Is there a surface-water diversion ditch ?

Does the collection chamber have an inspection manhole ?

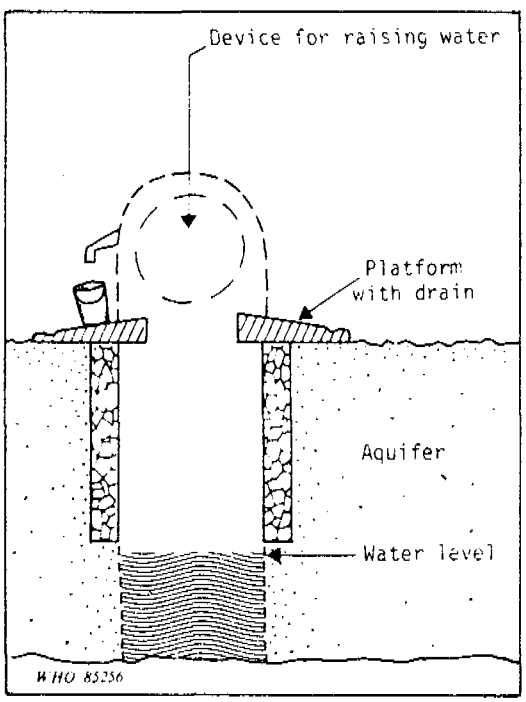
Is there a drainage tube ?

Are all openings protected against the entry of animals and direct access by humans ?

E. Dug wells

Is the water-raising system (buckets, ropes, etc.) inaccessible to users, animals, birds, insects, etc., and is it impossible for water drawn from the well to drain back into it ?

Is there an impermeable platform preventing entrance of any surface water into the well ? (This is particularly important if local flooding may occur.)



Adapted from WHO Drinking Water Quality Guidelines, Vol. 3

(2) Sampling points should be uniformly distributed.

(3) Samples should represent the most unfavourable places in the system.

(4) At least one sampling point should be located directly after the clean water outlet from each treatment plant.

(c) Frequency of Sampling

Examination of drinking water should be both frequent and regular, and sampling must be performed carefully. The frequency will depend on the quality of the source, the treatment, the risks of contamination, and the size of the population served. A new source of water supply should be monitored more frequently.

(1) Treated Water Entering the Distribution System

Any source of water that requires treatment should be examined daily at the point at which the water enters the distribution system. Residual chlorine should be measured and recorded frequently.

(2) Water in the Distribution System

It is desirable to take samples at least weekly, but this may not be possible with small systems. The following minimum sampling frequencies are recommended, the samples being spaced out evenly throughout the month:

Population Served	Minimum Number of Samples
Less than 5000	1 Sample
More than 5000	1 Sample per 5000 population

Other samples should be taken randomly throughout the distribution system, including multiple occupancy buildings such as schools.

These frequencies should be regarded as the minimum necessary, which should be increased in emergencies, epidemics, etc.

(3) Untreated Water and Unpiped Supplies

The frequency of sampling should be established by the appropriate control agency, and it should reflect local circumstances and results of sanitary survey.

(4) Emergency Water Supplies

Alternative water supplies should be planned in advance and selected on the basis of a sanitary survey. Adequate supply, frequent monitoring of chlorine residual and daily examination of water are needed. A public announcement should inform the public about the need to boil water.

(d) Collection of Samples for Bacteriological Examination

Care must be taken to insure that samples are representative of the water being examined and that no accidental contamination occurs during sampling. Samples should not be collected from taps subject to contamination, or from hoses and other attachments.

Samples should be collected in clean, sterile, glass bottle (200 to 400 ml capacity) containing 0.2 to 0.4 ml of a solution of sodium thiosulphate to neutralize any residual disinfectant.

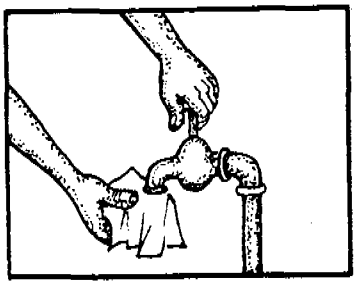
Water sampling can be divided into basic types: Sampling from a tap in the distribution system or from a fixed-hand pump, sampling from a watercourse or reservoir, and sampling from a dug well. Figs. 13, 14 and 15 illustrate procedures for obtaining water samples in each of these situations. Fig. 16 illustrates the procedure for the determination of residual chlorine.

Fig. 13

Collection of Water Sample from a Tap

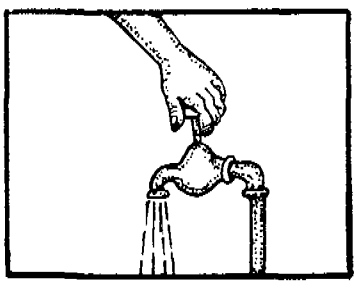
A. Clean the tap

Remove from the tap any attachment that may cause splashing, and using a clean cloth, wipe the outlet to remove any dirt.



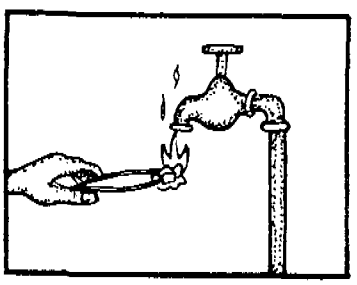
B. Open the tap

Turn on the tap at maximum flow rate and let the water flow for 1-2 minutes.



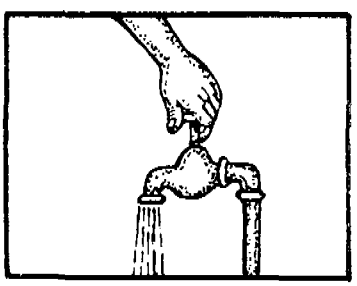
C. Sterilize the tap

Sterilize for a minute with the flame from an ignited cotton-wool swab soaked in alcohol; alternatively, a gas burner or cigarette lighter may be used.



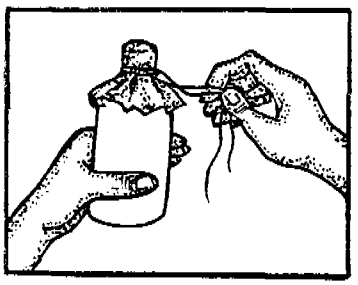
D. Open the tap prior to sampling

Carefully turn on the tap and allow the water to flow for 1-2 minutes at a medium flow rate.



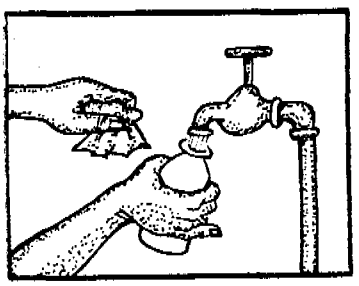
E. Open a sterilized bottle

Untie the string of the protective brown paper cover and pull out or unscrew the stopper.

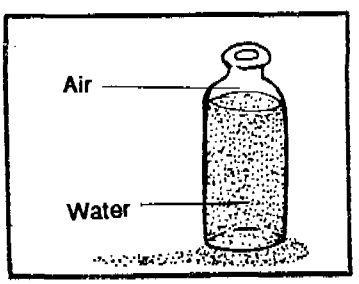


F. Fill the bottle

While holding the cap and protective cover face downwards (so as to prevent entry of dust that might carry microorganisms), hold the bottle under the water jet, and fill.



A small air space should be left to facilitate shaking at time of inoculation prior to analysis.



G. Stopper or cap the bottle

Place the stopper in the bottle or screw on the cap and replace the brown paper protective cap and the string.

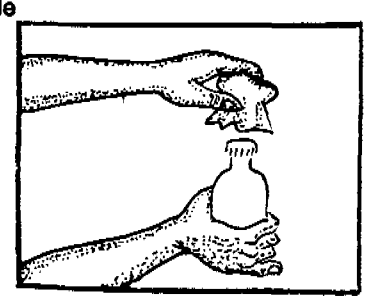


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Fig. 14

Sampling from a Watercourse or Reservoir

Open the sterilized bottle by techniques described in Fig. 13.

Holding the bottle by the lower part, submerge it to a depth of about 20 cm. with the mouth facing slightly upwards; if there is a current, the bottle mouth should face towards the current.

The bottle should then be stoppered or capped as described in Fig. 13.

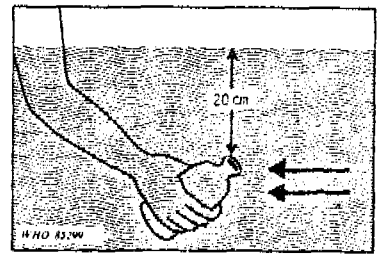

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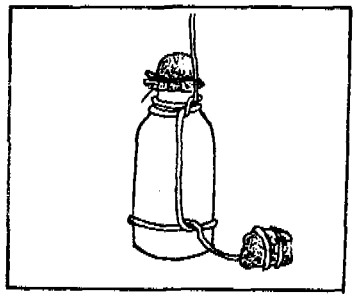
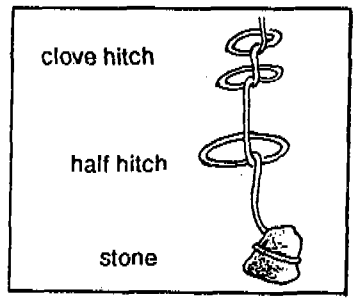
Fig. 15

Sampling from a Dug Well

A. Prepare the bottle

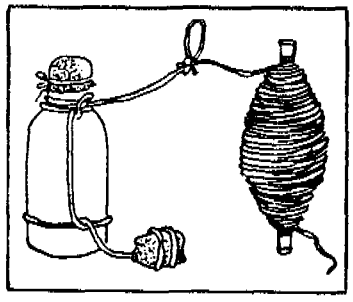
With a piece of string, attach a stone of suitable size on the sampling bottle.





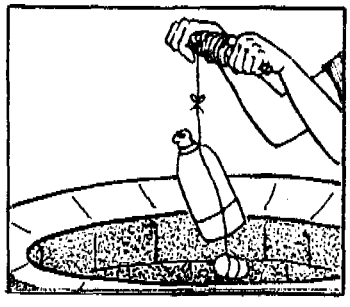
B. Attach bottle to string

Take a 20 m length of clean string rolled around a stick and tie to the bottle string. Open the bottle as described in Fig. 13



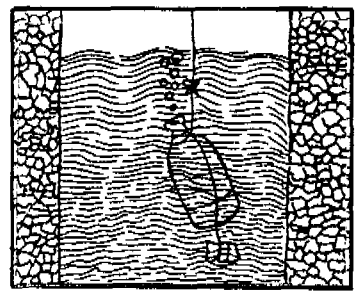
C. Lower the bottle

Lower the bottle, weighted down by the stone into the well, unwinding the string slowly. Do not allow the bottle to touch the sides of the well



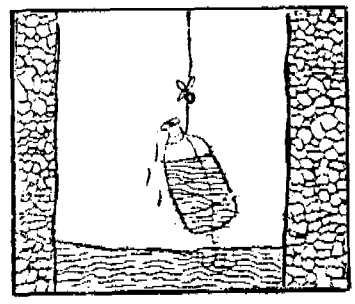
D. Fill the bottle

Immerse the bottle completely in the water and lower it down to the bottom of the well



E. Raise the bottle

Once the bottle is filled, rewind the string around the stick to bring up the bottle. If the bottle is completely full, discard some water to provide an air space

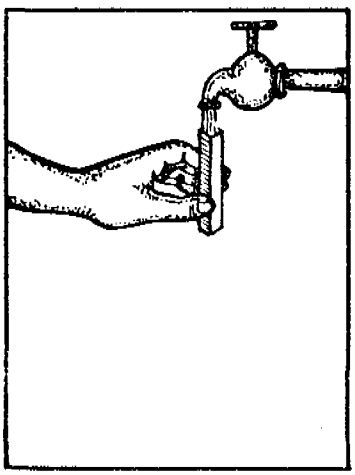


Adapted from WHO Drinking Water Quality Guidelines, Vol. 3

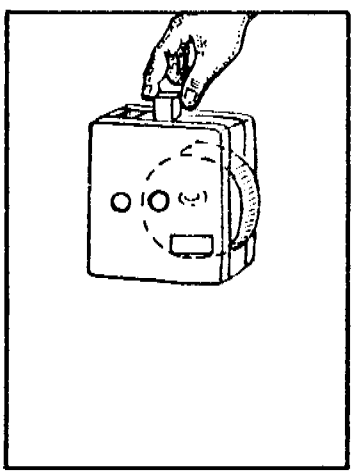
Fig. 16

Determination of Residual Chlorine

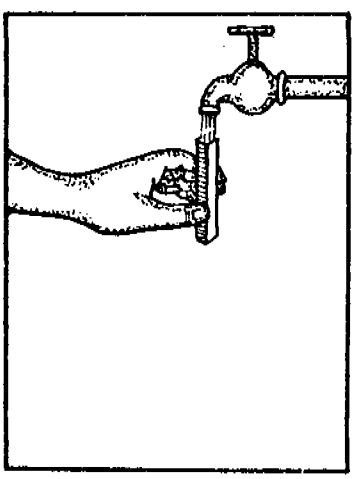
A. Rinse the comparator cell two or three times. and then fill it with the water sample up to the mark on the cell.



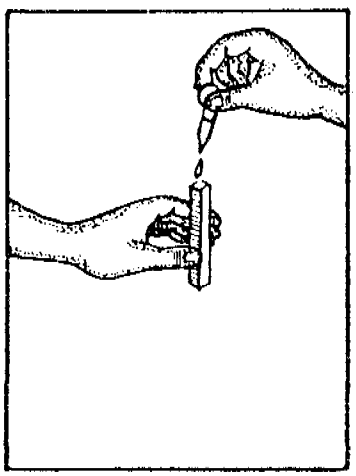
B. Place the cell in the cell carrier of the comparator in line with the coloured standard discs (B).



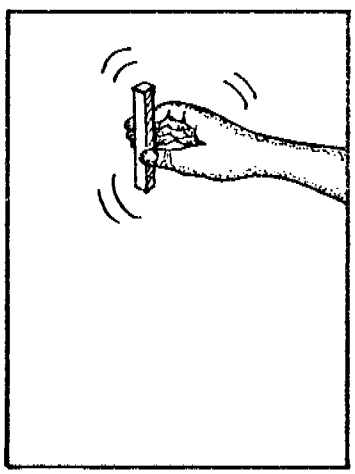
C. Rinse the second cell, and fill it with water from the same. source



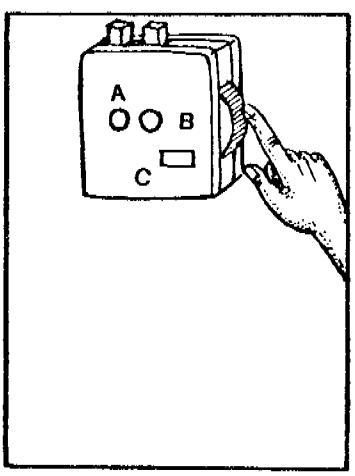
D. Add reagent in the second cell in accordance with manufacturer's instructions.



E. Shake the cell for not more than 3-5 seconds so as to mix the reagent, then place the cell in the comparator A.



F. While holding the comparator facing natural light, rotate the disc until the colour of a standard B is the same as that developed by the reagent A. Immediately read at C the value of residual chlorine in mg/l.



Adapted from WHO Drinking Water Quality Guidelines, Vol. 3

5. MANAGEMENT

5.1 Management of Work

Fig. 17 shows the organizational chart of UNRWA's Environmental Health Division, which is part of the Health Department. The division is headed by a sanitary engineer (Chief, Environmental Health, CEH) who is responsible for technical supervision including planning and coordinating the activities of the programme in the five areas of operations (fields).

In each field a sanitary engineer, assisted by a sanitarian, supervises the activities of the sub-programme, including planning, budgeting and other related activities. The field sanitary engineer reports technically to the CEH but he is responsible to his immediate supervisor, the Field Health Officer.

Each field is divided administratively into areas. A sanitarian (Sanitation Inspector, Area Sanitation Officer) supervises the activities of the programme in the camps located within his area(s).

In each camp, one or more sanitarians supervise and execute the activities of the programme including the supervision of the labour force (sanitation labourers, water attendants, etc.) assigned to the camp.

The number and category of staff at camp level is determined by camp population and other relevant factors. A small camp is supervised by one sanitation foreman B; the larger camps require a sanitation foremen A or chief sanitation foreman plus one, two or three sanitation foremen B (see 5.4).

5.2 Duties of the Sanitation Foreman

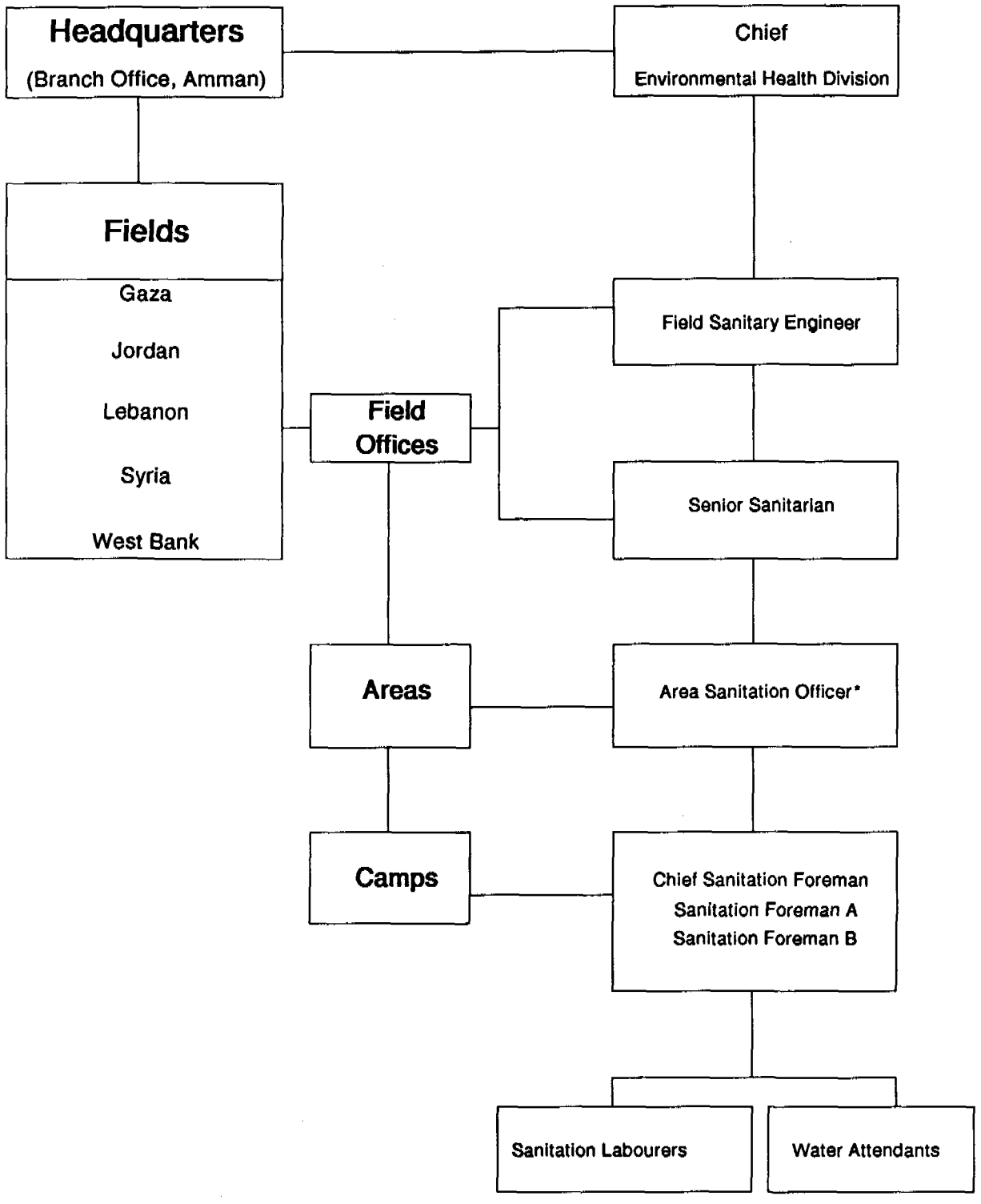
(a) The Sanitation Foreman is an important member of the health team. He is responsible to the Medical Officer In-Charge and to the Sanitation Inspector (Area Sanitation Officer/Camp Sanitation Officer) for technical matters and to the Camp Services Officer for administrative matters.

He is responsible for executing and supervising the environmental health activities in the camp or sector of the camp assigned to him as follows:

(1) Direct and supervise the sanitation labourers to carry out the following responsibilities satisfactorily:

- Collection, loading and disposal of solid wastes
- Cleaning and maintenance of public latrines
- Cleaning, clearing and scrubbing of surface water drains
- Insect and rodent control activities

Fig. 17
Organizational Chart of
UNRWA's Environmental Health Division



* titled: Sanitation Inspector in Jordan Field.

(2) Supervise water distribution, maintenance of water network and water disinfection.

(3) Inspect gathering places of insects, carry out necessary surveys with special attention to the elimination of fly breeding places.

(4) Assist in health education activities aiming at improving cleanliness of the environment in shelters, installations and markets.

(5) Inspect and report on cleanliness in the camps and installations.

(b) The Sanitation Foreman should be acquainted with the camp or the area assigned to him.

(1) General Information

Location, area, population, families, housing compounds and other statistics.

(2) Preparation of a Site Plan

Show the main streets, wadies, market places, installations, water reservoirs, water network, solid waste collection points, surface drains, culverts, etc.

(3) Water Supply

Source of water, number of water reservoirs, capacity, length and diameter of water pipes, number of water distribution points and taps at each point, sources of pollution, daily per capita consumption.

(4) Wastes

Solid waste types, methods of collection, storage, transport, disposal and quantity removed. Types and numbers of latrines. Length and number of connections and people served.

5.3 Management of Labourers

The sanitation foreman needs to understand the required work and his duties and responsibilities to make priorities and to form a schedule for his work. He will need to survey the camp and note the environmental conditions and requirements. Therefore, he has to keep information and records about health hazards and potential sanitary defects. In his work, a type of daily routine may creep in, and he can break this by making small specific objectives in his daily tour. Table 1 is an example for distributing these duties over the day.

Table 1
Model for Daily Duties of Camp Sanitation Foreman

Duties	Time
1. Prepare for the work Attendace of labourers; Protective clothes on; Remarks about the work; Instructions and directions; Issue of tools.	07:00–07:15
2. Clerical work Leaves; Referrals to health centre; Remarks for reports.	07:15–08:00
3. Preliminary inspection Start work; Quick inspection of the camp and labourers' tools; Environmental health deficiencies; Building violations (to report to Camp Services Officer, CSO).	08:00–09:00
4. General inspection Water network; Public latrines; Drains; Solid wastes collection points (removal and quantity); Environmental health projects; Maintenance works; Installations (schools, feeding centres, etc..); Market places; Cleanliness and sanitary facilities at shelters; Cleanliness in the streets and alleys.	09:00–11:30
5. Administrative work Meeting the foreman and discuss observations; Report important observations to CSO/Sanitation inspector; New administartive instructions; Write notes, figures, and prepare report.	11:30–12:00
6. Follow up work and correct deficiencies Ensure that labourers are at work and have completed their work; Places with unsatisfactory cleaning; Eliminate health hazards; Organize group work.	12:00–13:45
7. Labourer dismissal Gather labourers and store their tools; Instructions and directions; Remarks about the work; End the work day.	13:45–14:00

Good organization of the labour force is a requirement for efficient performance. In order to achieve it, the sanitation foreman has to be organized and train himself to be orderly, logical and make priorities.

What distinguishes the good sanitation foreman is order and discipline in his work. Management requires planning (thinking ahead) and order in recording, filing and information storage so that it can be easily retrieved.

Some of the required records include:

(a) Names, addresses, employment numbers, ages, education and residences. Also needed are daily records of attendance and records of annual and sick leaves.

(b) Measurements for protective clothing. Are the records correct? Have the sizes been checked? Are there records of what each labourer has received?

(c) Work tools and cleaning supplies. Is the store tidy? Are there records of what each labourer has received? Are there records of what each labourer used for maintenance of his tools and wheelbarrow?

(d) Organization of leaves. Most labourers want their leaves in summer, but the workload increases in summer. Are there records of the sick leaves of each labourer?

(e) Distribution of labourers and duties in the camp. The amount of work should be known beforehand and the workload should be distributed fairly. Are there records of the distribution of areas and workload in each area?

(f) Self-help projects to improve the camps. It is necessary to supervise and control the delivery of materials. Daily records of delivered materials and completed work are required. Also, weekly, monthly and completion of work reports are required. Has the delivery truck been measured to determine its capacity? Does the truck arrive with full capacity?

5.4 Norms and Standards Applied in Refugee Camps

The following information is summarized from UNRWA's Occupational Classification Manual, Budget Technical Instructions and Technical Instructions Related to Environmental Health.

5.4.1 Determination of the Number of Staff Needed

The sanitation labourer and supervisor norms have been the subject of discussion and review since the establishment of the camps. The norms have been amended in line with the changes in the camps over the years.

The presently applied norms are as follows:

(a) Sanitation Labourers

The number of sanitation labourers in camps is determined as follows:

(1) 1.5 labourer posts per 1000 registered camp residents for camps with difficult terrain. Camps classified under this category are the following:

Jordan : Jabal Hussein, Jerash and Hittin
West Bank : All camps except Ein Sultan, Nuweimeh, Azzeh and Balata
Syria : Dera'a
Lebanon : Nahr El-Bared and Ein El-Hilweh
Gaza : None

(2) 1.4 labourer posts per 1000 registered camp residents for the other camps.

(3) In addition, sanitation labourer posts are authorized for special factors having a bearing on environmental health services in the camps as follows:

- One sanitation labourer for each 40 public latrine seats
- One sanitation labourer for each 50 stables and poultry sheds
- One sanitation labourer for each 5000 squatters adjacent to the refugee camp
- One sanitation labourer for each 500 vacant shelters (applicable in some refugee camps in the West Bank).

(b) Sanitation Foremen

The number of sanitation foremen is determined as shown in Table 2.

Table 2 Number of Sanitation Foreman Needed

Post Title	Number of labourers supervised				
	3-15	16-31	32-55	56-75	76-100
Sanitation Foreman B	1	1	2	3	4
Sanitation Foreman A	-	1	1*	-	-
Chief Sanitation Foreman	-	-	-	1	1
Total Posts	1	2	3	4	5

* Post becomes that of Chief Sanitation Foreman when the number of labourers exceeds 42.

5.4.2 Cleaning Supplies and Tools

Cleaning supplies and tools vary from area to area according to the activities carried out by the labourers and the physical conditions in the camp. Quantities are determined in the light of expenditure and experience in the previous year or years which is reviewed regularly.

The norms applied for budgetting 1992/93 are shown in Table 3.

Table 3
Provision Rates of Supplies and Tools

Description	Annual Issue per Labourer				
	Gaza	Lebanon	Syria	Jordan	West Bank
a. Cleaning Supplies:					
Brush, external use, stiff	-	-	3.00	6.00	-
Handle, wooden	1.00	2.00	2.00	3.00	2.00
Broom, heavy duty, nylon bristles	1.00	4.00	3.00	0.50	4.00
Brush, latrine, stiff bristles, 4 cm	-	-	-	-	0.10
Brush, scrubbing, 20 cm	0.20	2.00	-	0.10	-
Liquid soap, kg	1.00	-	-	-	-
Toilet paper, roll	2.00	-	-	-	-
b. Tools:					
Handle, sugar beet hoe	0.07	0.15	0.05	0.05	0.07
Handle, 38" clay pick	0.05	0.15	0.50	0.05	0.07
Handle, rake	0.22	0.35	0.25	0.40	0.30
Handle, shovel 48"	0.43	0.35	0.50	0.30	0.15
Pick clay 2.5 kg	0.10	0.30	0.10	0.03	0.14
Rake 14" wide 14 teeth	0.45	0.70	0.50	0.50	0.45
Shovel, square point	0.86	0.70	1.00	0.50	0.30
Palestine citadel hoe (spade)	0.14	0.30	0.10	0.04	0.14

5.4.3 Protective Clothing

Sanitation labourers should be provided with protective clothing to carry out their responsibilities.

- One rain coat for each sanitation labourer and foreman every four years
- One pair of rubber boots for each labourer and foreman per year
- One pair of leather boots for each labourer and foreman per year
- Two pairs of overalls per labourer per year
- Two pairs of leather gloves per labourer per year
- One hat for each sanitation labourer and foreman per year
- One towel per labourer per year
- One piece of soap per labourer per month
- Two safari suits per foreman per year

5.4.4 Maintenance Budget

The budget for maintenance, stationery, fuels and insecticides is prepared on the basis of past expenditure and experience.

5.5 Communication with Target Groups

In his work, the sanitation foreman can employ his skill in communication to facilitate his work and to perform health education.

5.5.1 Definition

Communication is a process of exchange of ideas, attitudes, and information between individuals to achieve private and public aims. Communication is give and take.

5.5.2 Elements of Communication

(a) Sender

The sanitation foreman is the sender and he has an objective to be achieved.

(b) Receiver

The person to contact: a labourer, a sanitation inspector, a school master or a housewife.

(c) Message

It is what the sender wants to communicate. Usually he prepares and delivers the message in his own way.

(d) Method

The main method to use is direct contact, whether with the labourers, the housewives, the school master, the school child, the citizen or with one of the camp committee.

(e) Impact

It is the effect made on the receiver.

(f) Reaction

It is the response of the receiver.

5.5.3 Communication Methods

(a) Direct Contact

As mentioned, it is the main method. Because of the nature of the work, the foreman is in constant contact with the people, the labourers and other fellow workers. Direct contact may be with one individual (one labourer, one housewife) or one group (the labourers, a group of citizens).

The sanitation foreman uses direct contact to transfer information to educate and to exchange points of view. Direct contact is a dialogue between two individuals and not the imposition of his views. In this way, he, as a health educator, has to encourage the individual to identify the problem and its causes and to help him reach a conclusion about it. In each discussion and dialogue, he has to know the problem and the causes.

To be successful:

- Be on good terms with individuals.
- Understand needs and problems as seen by others.
- Understand others' feelings; listen and observe carefully.
- Discuss solutions according to potentials and abilities and encourage active participation.
- Ask questions which encourage response and lead to active participation. Avoid questions which imply answers.

Questions may begin with:

- What? (information needed)
- Why? (clarification and causes of events or behaviour)
- How? (analysis and causation to help in education and persuasion)
- Where? When? Who? (place, time and persons)

The sanitation foreman has to listen carefully to the answers and make sure the question is understood and that he has understood the reply to the question.

When done, he has to make sure the message has achieved its effect and the receiver (the individual) has responded.

This method is very effective if properly carried out. It is also tiring because it requires effort and time.

(b) Training and Actual Practice

He uses this method when he wants to teach one of his labourers a skill such as use of sprayer. It is not enough to explain and read the instructions. He has to carry out a practical demonstration, then ask him to do it under his supervision. It is not enough to explain to the labourers how to use cleaning equipment, or the life cycle of a fly. He has to use the equipment, and show them the different stages in the life cycle of the housefly in field conditions and let him see the larvae and pupae. In training, he has to be certain of the facts and information related to the tasks the trainee has to master.

(c) Writing Official Reports, Articles, etc.

He does formal reporting because it is part of his duties and makes sure that facts are clear, direct and concise. He should handle facts and clear information, be direct and specific.

Writing articles, etc., is another matter pertaining to his personal inclination and abilities.

(d) Group Discussion

He needs to listen to views, suggestions and answers from fellow workers or citizens. He employs this method daily when meeting with his labourers, or members of the community, or with school children.

Before conducting a group meeting, he has to plan very well in advance. Otherwise, the discussion may get out of hand. To plan for it, he needs to define the subject (or subjects) and to make sure he knows it well. He has to write down the main ideas and define the place of discussion. In the discussion, he should be polite, and nice, use his communication skills, and be one of the group.

(e) Meetings

He will attend and participate in many meetings during the course of his duties. If he is asked to plan for a meeting, he should know its purpose, number attending, time and place of meeting and the programme.

If he is asked to attend a meeting, he has to prepare himself with the information he needs for the meeting.

6. SURVEY AND EVALUATION OF ENVIRONMENTAL HEALTH ACTIVITIES

6.1 Components of Survey and Evaluation

The objective of environmental health surveys is to collect facts and information as the basis for short or long term decision making. Information collection aims at evaluating the environmental health services, their deficiencies and overall impacts on the community.

Environmental health activities directly touch all categories of the community, and therefore, the community and/or its representatives should have an active role in these activities. They should be involved in all stages of the survey and be aware of their problems and their role in these activities. Survey and evaluation of environmental health activities may follow the following steps:

6.1.1 Specifying Objectives of the Survey

- Evaluation of environmental health services.
- Investigation of apparent deterioration in community health indicators.
- Detection of deficiencies.
- Identification of areas for service improvement or upgrading of efficiency.
- Promotion of community awareness and participation by providing information about the quality of the services and the findings.

6.1.2 Collecting Information

(a) Information Required

Information about the community, its leaders, resources, customs and beliefs as well as information about the services to be surveyed, and how they are viewed and judged by concerned parties should be collected.

(b) Importance of Information Collection

It is important to determine the level of activities and select alternative solutions. Therefore, information should be accurate, detailed and with statistics to evaluate the activities or problems accurately.

(c) Approaches

(1) Through Observation

- What to observe, when and how
- Observe individuals and/or groups
- Involve others in observation.

(2) Interviews and Questionnaires

- Utilize general and specific questions
- Interview individuals, groups, officials
- Use direct questions, open questions multiple-choice questions, etc.
- Build confidence between the interviewer and those interviewed.

(3) Records and Documents

- Records (books, letters, pamphlets and health centre records)
- Statistics concerning one or more activities from various sources (complaints, verbal or from the media, or other sources).

6.1.3 Analyzing the Activities and Setting Priorities

(a) Understanding the Activities and Problems

(1) Understand why activities are provided and information is collected. Are there other ways of carrying out the activities?

(2) Find if there are any problems, and if the community understands the problems.

(3) Present methods for solving problems and improving activities.

(b) Setting Priorities

Since resources are limited, all needs can not be met, and priorities have to be set.

(1) Most important activity or serious problem first
(2) Activity which benefits the largest population
(3) Activity which will yield the most benefits
(4) Activity for which resources are available

6.1.4 Preparing Action Plan and Procedures

The survey action plan is a blueprint for achieving survey objectives. It includes the list of tasks to be accomplished, duration of each task and the assigned staff, locations and frequency of sampling or observation, information to be obtained and the sources, and an overall timetable for all activities.

Required, or preferred, procedures for sampling, analysis or presenting results should be clearly described. Use of suitable forms or questionnaires will greatly enhance compliance with the plan requirements.

6.1.5 Securing Resources

(a) Identify the required capital, human and technical resources

(b) Determine what resources are available locally, regionally, nationally or internationally

(c) Define resources appropriate to the community

(d) Mobilize community support and participation

(e) Ensure that assigned manpower is clear on plans and procedures and on how to use available resources.

6.1.6 Implementation and Evaluation

(a) Maintain communications with assigned staff; review progress and adjust plans immediately if necessary; study plan of action periodically for projection of opportunities or problems.

(b) Assess and interpret the information collected; understand and specify deficiencies, problems, improvements, etc.

(c) Analyze the difficulties in conducting the survey or evaluation of data; seek advice based on previous experiences; record lessons to be learned.

(See Appendix "A" for forms used in the sanitary survey of camps).

6.2 Reports and Forms

6.2.1 Reports

(a) Reports are intended to provide information concerning programme activities and to indicate progress. Reports may be narrative with comments and with no or very little statistical data. Reports also may be narrative supplemented with statistical tables. Environmental health reports may cover all or some of the following headings:

(1) Water Supply

Change in quantity and quality of water supplies, measures taken, installing of new indoor taps, water standpipes eliminated, etc.

(2) Waste Disposal

- Latrines and sewerage: number of new or eliminated public and family latrines and new sewerage connections, voiding operations, etc.

- Solid waste collection and removal: problems in collection and removal, measures taken, workdays, quantity of refuse removed, refuse vehicles, refuse platforms and containers.

(3) Surface Drainage: storm water drainage, surface drains and culverts constructed, replaced, maintained and repaired.

(4) Insect and Rodent Control

- Flies: Fly index before spraying, area sprayed in square meters, fly index two days after spraying, insecticides used.

- Lice: Persons examined, persons positive louse index (%), persons and clothing deloused, insecticide used.

- Fleas, Bedbugs: Shelters inspected, shelters infested, index (%), shelters treated, insecticides and quantities used.

- Rodents: Number of traps used, number of mice trapped, campaigns or chemical control activities.

(5) Self-Help Camp-Improvement Projects: Work accomplished, materials used, contacts made with concerned authorities, etc.

(6) Ancillary Facilities

- Bath Houses: Number of persons attended, number of baths taken, quantity of cleaning materials (soap) and fuel used, maintenance carried out, etc.

- Slaughter Houses: Type and number of animals slaughtered and repairs carried out.

(7) Population/Housing: Number of persons, families, shelters, housing compounds, extensions to camps, vacant shelters, number of squatters.

(8) Miscellaneous: Sanitary conditions and status at UNRWA installations and public establishments, and measures taken to rectify deficiencies. Number and cleanliness at stables and poultry sheds.

(9) Personnel: Establishment and elimination of posts, retirement, resignations, transfers, etc.

(10) General: Information on major events which may affect environmental health activities such as weather, roads, UNRWA or Government projects.

(b) Types of Reports

Reports may cover a certain period. In general, there are daily, weekly, monthly, quarterly, biannual, annual and other reports as required.

(1) Daily Report

The daily activities of the Sanitation Foreman and others which have an effect on the environmental health programme are included, e.g., number of labourers, those on leave, water supply to the camp, inspections of installations and households, insect and rodent control activities.

(2) Weekly Report

The main daily activities during the week, insect indices and other statistics necessary for the monthly report are included.

(3) Monthly Report

The main activities and events during the month, and totals or averages of statistics for the various activities are included.

(4) Quarterly, Biannual and Annual Reports

These reports are designed to cover major events and accomplishments concerning one or more activities during the period.

(5) Special Report

One activity, e.g., refuse removal during a certain period (quantities, number of loads, etc.) or a specific project, e.g., a self-help project (works accomplished, materials used, areas paved, refugee and UNRWA contributions, etc.) may be covered.

6.2.2 Forms (Annexes A and B)

Forms are intended to:

- Specify information to be collected
- Expedite insertion of details and information
- Eliminate the need for writing and typing of static recurrent headings
- Facilitate data recording and processing for future reference and retrieval

For effective management, special forms may be designed for collecting information for appropriate submission to the responsible officials for action and retention. Forms save time and enhance communications.

Annexes A and B show some forms that could be used to collect information on the environmental health situation in refugee camps, or to be used in preparation of reports.

Annex A

Forms for Sanitary Survey of Camps

1- General Information

Name of Camp: .....

Location : ..... Date: .....

1. Area of Camp: ..... 2. Population: .....

3. No. of Housing Units .....

4. Site Topography : (Including Natural Features):

.....

5. Neighbourhood: (including residential areas)

.....

6. Transport facilities: .....

7. Agency installations: .....

8. Other installations (Gov., etc.): .....

9. Other installations (Private): .....

10. Committees. Camp Services Committee: .....

11. No. Stables : ..... Poultry Sheds:.....
Butchers: ..... Restaurants :.....

2- Water Supply

1. Source(s) of Water (type and condition).....
   Responsible authority: .....

2. a. Treatment (type and equipment).....
      Responsible authority: .....

   b. Is chlorination continuous? Yes/No
      Type of Chlorine used:.....
      Chlorination rate: .....

3. Main Water Reservoirs(Number, type and capacity):

   .....

4. a. Water Distribution: Private taps, No.: .....
      Responsible authority: .....
      Public taps No. and distribution: .....

   b. Is pumping continuous? Yes/No.....
      How long stoppage occurs?.....

5. Quantity of water delivered: .....m^3/day

6. Is chlorine residual checked? Yes/No. How frequent?.....
   Where? .....
   What is the chlorine residual? .....

7. Are samples collected for bacteriological testing? Yes/No...
   How many samples are collected? where? and when?.....
   .....

8. How many samples collected during last year?.....
   How many unsafe? .....

9. Number of Agency staff in Water Sector?.....

10. Others: (other sources, problems, etc.).....
    .....

3- Liquid Wastes

Human Excreta:

1. No. and type of latrine units.....
   No. of family latrines.....
   No. of public latrines.....

2. Is there a service for voiding pits? Yes/No.....
   (Gov't.(....), Agency tanks (....), private(....),other(...)

Wastewater:

3. How is wastewater (cleaning, kitchen) disposed of?
   Cesspit(.....), surface ditches/drains (.....), collected and sprayed(.....), underground drains (.....)
   other(.....)

4. State types and lengths of surface drains
   Earthen.....
   Concrete: covered..... Open.....
   Pipe.....

5. Final disposal.....

Sewerage System:

6. If there is a public sewerage system in the camp, state:

   a. Responsible authority.....
      Date of commission.....

   b. Coverage of camp.....
      No. of connected units.....

   c. Type of treatment.....

   d. Final disposal.....

Rain Water:

1. Describe, in general, topographical features.....

2. Are there valleys? .....

3. Are there drains for rain water? .....

4. Areas subject to flooding .....

4- Solid Wastes

1. No. of sanitation labourers.....
   No. of Sanitation Foremen.....

2. Type and Number of carts (.....) and wheel barrows(.....)

3. Collection from houses: daily..... weekly.....

4. Are there collection points?.....
   State No. and Type.....
   State No. and Type of containers.....

5. Transfer of solid wastes.....
   Agency vehicles: No. and type.....
   Municipal contract: (Name, vehicles, capacity, value).....
   .....
   Private contract: (No. of vehicles, capacity).....
   .....

6. Quantity transferred per year.....m^3
   Average daily during the period of.....
   Minimum daily..... Maximum daily.....

7. Final Disposal.....
   Type: Dumping, landfill, incinerator, open burning etc.

   Responsible authority.....

   How far from camp?.....

Annex B

Forms Used for Reporting Environmental Health Activities In Camps*

* UNRWA Refugee Camps

(a) Water Supply & Excreta Disposal

Field: ..... Month: .....

Camp	Served Population	Housing Units	Family Units	WATER					Latrine, Number of seats					Labour		
				Source	m^3 Supplied	Hours Avail./Day	No. of Taps		Public	Private			Per 100	Labourer	Water Att.	Vacancy
							Public	Private		Agency	Refugee	Total				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Total or Average																

(a) Water Supply & Excreta Disposal
Explanatory Notes

Cols. 2,3 & 4	Base on the registration and statistical bulletin data generally. When difference exists, explain the difference.
Col. 5	Source may be spring, well, river, etc. if town supply or through tankers, state in parenthesis "town" or "tankers" in addition to the nature of source .
Col. 6	The quantity used should be assessed where there are no meters or reservoirs and the total monthly quantity reported generally.
Col. 7	Number of hours daily public water supply is made available to the refugees.
Col. 8	In the case of public taps, state within brackets the number of water points.
Col. 15	Exclude school latrines and latrines to installations. Compute seats per 100 on the basis that every 6 private latrine seats are equal to 1 public latrine seat.
Col. 16	Number of sanitation foreman (in parenthesis), and sanitation labourers, eg. (1) 11.

(b) Camp Facilities

Field: ..... Month: .....

Camp	REFUSE								Bath Houses		Slaughter Houses	Milk & or Feeding Centres	(Schools) No. of Pupils	Meat & or Food Establish-ments
	Collection					Disposal								
	Wheelbarrows		Tractors/ Trailors	Other Vehicles	Platforms or bins	Incinerators	Compost Pits No. & Volume	Other Methods	No. of Showers	No. of Baths Taken (persons)	No. of Animals Slaugthered			
	Ordinary	Improved												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Total														

(b) Camp Facilities
Explanatory Notes

Col. 9	"Other methods" may be municipal, contractual or Agency removal to dumping areas outside camps.
Col. 10	Give number of bathrooms and number of cubicles with shower heads. Add letter "H" if hot water is made available.
Col. 11	Give number of baths taken and in parenthesis, corresponding number of persons taking baths (N.B. A person may take baths several times and hence number of persons may be less than number of baths).
Col. 15	Iclude all regualr and fixed establishments.

(c) Insect & Rodent Surveys

Field: ..... Month .....

Camp	FLIES		LICE			BEDBUGS			RODENTS		
	Adult Index		No. of Persons Examined	No. of Persons Positive	Index	No. of Rooms Examined	No. of Rooms Positive	Index	No. of Traps Used	Trap Days Used	No. of Rats Trapped
	Pre-Spraying	Post (2 days) Spraying									
1	2	3	4	5	6	7	8	9	10	11	12
Total											

(c) Insect & Rodent Surveys
Explanatory Notes

General — All indices in camps should be based on randomly selected groups of population representing the entire camp (and not on the basis of selected infected areas or population forming a part of a camp).

(d) Insect Control Operations

Field: ..... Month .....

Camp	FLY CONTROL			BODY LOUSE CONTROL				BED BUG CONTROL		
	Pre-Spraying Index	m^3 Sprayed	Insecticide Used & Qty. in Kgs.	Pre-Spraying Index	No. Deloused		Insecticide Used & Qty. in Kgs.	Pre-Spraying Index	No. of Rooms Sprayed	Insecticide Used & Qty. in Kgs.
					Persons	Clothing				
1	2	3	4	5	6	7	8	9	10	11
Total										

N.B. Report on occasional flea and sandfly control operations, if any, to be submitted on the same lines as above as an addendum to this table

SIX MONTHLY REPORT
ENVIRONMENTAL HEALTH SERVICES
IN REFUGEE CAMPS
PERIOD FROM TO 19

Date .....

Camp	Population As on	Housing Units	WATER SUPPLY			LATRINE FACILITIES		REFUSE DISPOSAL			MANPOWER		
			Source (Agency, Municipal etc ...)	Percentage of Refugees Served by Indoor Taps	Percentage of Refugees Served by Public Taps	Percentage of Refugees Served by Family Latrines	Percentage of Refugees Served by Sewerage	Camps served Through contract Arrangement		Camps Served By UNRWA Vehicles	Camp Level Super-Visors	Labourers	Water Att.
								Municipal-ities	Private Contractors				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Total													

SANITATION AND MAINTENANCE OFFICE INSPECTION FORM

SCHOOLS

Area ..... المنطقة School ..... المدرسة Date ..... التاريخ

Building type ..... نوع البناء Hour ..... الساعة

Number students ..... عدد الطلاب Number classrooms ..... عدد غرف الدراسة

BUILDING البنـــاية

Floors in good repair ..... الارضية بحالة حسنة Walls ..... الجدران

Roofs ..... السقف Windows ..... الشبابيك

WATER SUPPLY مورد المـاء

Describe water supply ..... صف مورد الماء

Is it adequate ..... كافية ؟ Is it safe ..... نقية ؟

Number of taps ..... عدد الحنفيات Are they adequate ..... كافية ؟

LATRINE المراحيض

Number of latrines for students ..... عدد المراحيض للطلاب

Are they adequate ..... كافية ؟ Number of urinals ..... عدد المباول

Are they clean ..... نظيفة ؟ Well maintained ..... حسنة الصيانة

LIGHT الاضـاءة

Is lighting sufficient ..... هل الاضاءة كافية ؟

If not, in which rooms ..... ان لم تكن كافية، في اي غرف؟

GENERAL CLEANLINESS النظافة العامة

Yard area clean ..... الفناء نظيف ؟ Building clean ..... البناية نظيفة ؟

Is play area sufficient ..... هل الملعب كاف ؟

Is there promiscuous defecation in area ..... هل هناك براز منتشر في المنطقة؟

If so, is it cleaned up daily ..... اذا كان هكذا هل ينظف يومياً ؟

Refuse disposal satisfactory ..... تصريف النفايات مرض ؟

Drainage adequate ..... التصريف كاف؟

LICE القمـــل

Number examined for lice..... عدد الذين فحصوا القمل Number positive..... عدد الايجابي

OTHER ملاحظات اخرى

.....

.....

.....

.....

SPECIFIC CRITICISMS OR RECOMMENDATIONS ملاحظات خاصة او توصيات

.....

.....

.....

.....

.....

Signed ..... الامضاء

Title ..... الوظيفة

Seen نظر

.....
Headmaster مدير المدرسة

Copies to :

1) Headmaster
2) Area Officer
   Attention : Area Education Inspector
3) Field Education Officer.

نسخة الى :

١) مدير المدرسة
٢) مراقب المنطقة
   الى مفتش التعليم في المنطقة
٣) مراقب المنطقة

06.3.040.1 **U. N. R. W. A**

SANITATION & MAINTENANCE
INSPECTION FORM
MILK AND FEEDING CENTRES

وكالة هيئة الأمم المتحدة للأغاثة والتشغيل
مكتب الشؤون الصحية والصيانة
نموذج تفتيش
مراكز التغذية وتوزيع الحليب

المنطقة مدينة/مخيم/قرية
Area ..... Town/Camp/Village .....

التاريخ الساعة نوع المركز
Date ..... Hour ..... Type of Centre .....

البناء BUILDING

الأرضية نظيفة بحالة حسنة السقف بحالة جيدة
Floor clean ..... in good condition ..... Roof/Ceiling in good condition ..... طلاءة المطبخ مرضية Limewash of kitchen satisfactory .....

طرش آخر مرة المنجور نظيف الدهان مرضي
was last done ..... Woodwork clean ..... Paint satisfactory ..... دهن آخر مرة الشبابيك نظيفة
was last painted ..... Windows clean .....

بحالة حسنة الستاير بحالة حسنة
..... in good repair ..... Screening in good repair .....

أبواب الحواجز تغلق من نفسها أبواب الحواجز وجدت مغلقة
Screen doors self-closing ..... Screen doors found closed .....

النور كاف المدافئ والمداخن بحالة جيدة
Lighting sufficient ..... Stove and chimneys in good condition .....

الطاولة والبنوك نظيفة
..... Table and benches clean .....

المياه WATER SUPPLY

الكمية كافية الخزان كاف
Quantity sufficient ..... Storage adequate .....

النبع الصنف
source ..... Quality .....

المجاري DRAINAGE

طريقة المجاري المجاري مرضية
Method of drainage ..... Drainage satisfactory .....

اذا لم تكن كذلك: لماذا؟
if not, why not .....

المرحاض LATRINE

المرحاض جاهز بلاط المرحاض نظيف
Latrine available ..... latrine slab clean .....

حائط المرحاض نظيف
latrine wall clean .....

المخازن STORES

المخازن نظيفة كل المواد المخزونة مرتفعة عن الأرض
Stores clean ..... all supplies stored off floor .....

الاوعية UTENSILS

الأوعية نظيفة نظيفة بالمس
Utensils look clean ..... feel clean .....

العمال WORKERS

ذقون العمال محلوقة أيديهم نظيفة
Workers clean shaven ..... hands clean .....

ملابسهم نظيفة لابسين قبعاتهم
clean uniforms ..... hats worn .....

Fly Control مراقبة الذباب

الذباب موجود بكثرة في المركز
Flies numerous in centre ..... مواد الرش والطلمبة موجودة space spray and flit gun available .....

الرش يعمل به يوميًا
..... space spraying done at least once daily .....

Garbage and Area النفايات والساحة

تؤخذ النفايات يوميًا بشكل مرضي
Garbage properly disposed of daily .....

الساحة الخارجية مرضية
outside yard area is clean .....

Rodents القوارض (المصايد)

هل القوارض موجودة هل يمكن جعل البناء مأمونًا من الجرذان
Are rodents present ..... if yes, can building be ratproofed

القوارض استعملت
..... traps used .....

Other اشياء اخرى

.....

.....

.....

.....

Specific Criticisms or Recommendations ملاحظات خاصة او توصيات

.....

.....

.....

.....

نظر
Seen .....
Centre Supervisor
مراقب المركز

الامضاء
Signed .....

الوظيفة
Title .....

Copies to:
1) Field Health Officer
Attention: Field Food Supervisor
Through: Area Officer
2) Area Officer
3) Filed in Centre Inspected.

نسخة الى :
١- مراقب الاغذية في المنطقة بواسطة مراقب المنطقة
٢- مراقب الاغذية للمنطقة
٣- الملف

Fly Index

Area: ..... Camp: ..... Date: ..... Week No.: ..... Date of Spraying: .....

Place	No. of Places															Total of the Highest five Readings	Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
1. Inside Shelters																	
2. Yard outside the shelters																	
3. Stables and poultry sheds																	
4. Areas adjacent to stables etc ... containing manure																	
5. Public latrines																	
6. Accumulated refuse and places wetted with wastewater																	
7. Market, vegetables and food shops (sweet shops, grocery, cereal shops)																	
8. Butchers, poultry shops and slaughter houses																	
9. Milk centres, resturants, coffee shops																	

NB.:

1. Average: The total of highest 5 readings /5
2. Week Average: The total of the nine avearges /9

Bacteriological Examination of Water

Authority: .....

Community: .....

Sample Site: .....

Sample No: .....

Sender: .....

Place: .....

Source: .....

Date of Sampling / / Time: .....

Date of Analysis / / Time: .....

Residual Free Chlorine ..... mg/litre

Results

Total Coliforms: ..... / 100 ml

Faecal Coliforms: ..... / 100 ml

Water Bacteriologically: Safe ☐ Unsafe * ☐

* If unsafe repeat sampling and start remedial measures

Labratory Technician .....

Chief (Signed) .....

Monthly Report on Drinking Water Sampling
For the Month of 19

No.	Date	Sampling Point	Residual Chlorine mg/l	MPN / 100 ml		Remarks
				Coliform Count	E. Coli	

Annex C

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